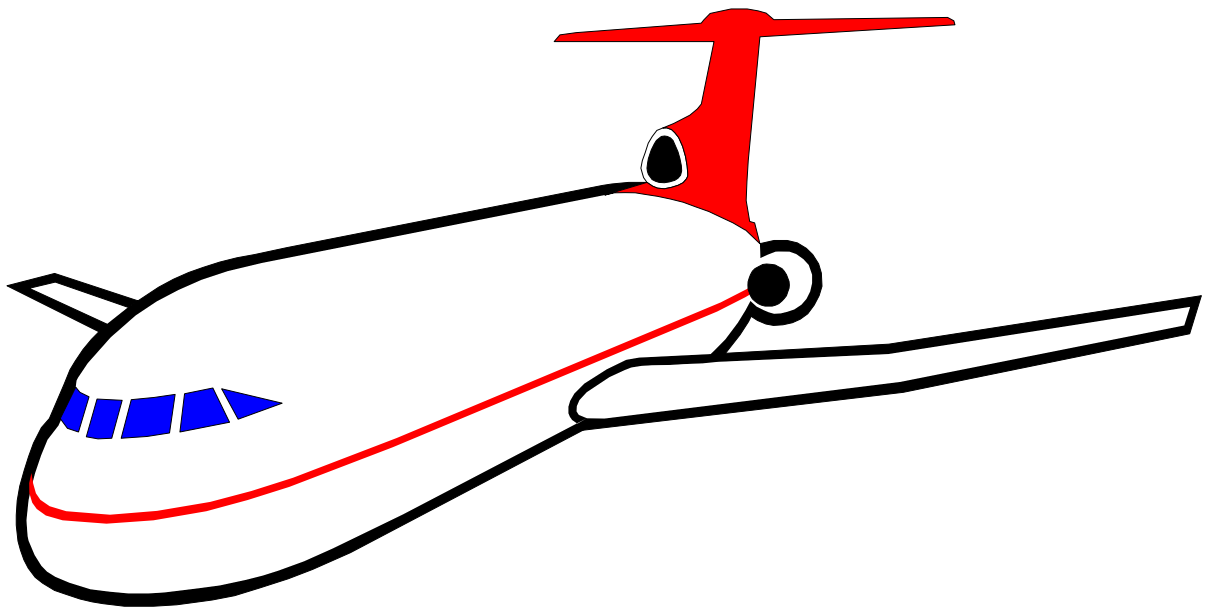


# **MANUAL FOR DOCUMENTATION OF AIRPORT MATERIALS**

**(February 15, 2004)**



**Division of Aeronautics**

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## **SECTION 100. - GENERAL**

### **100.01 INTRODUCTION**

The purpose of this manual is to assist the Consulting Engineer in the preparation of the Materials Certification Report for submittal to the Chief Engineer of the Illinois Division of Aeronautics (IDOA). The purpose of the Materials Certification Report is to ensure that all materials supplied to the project were in substantial conformance with contract documents. Materials are determined to be in conformance with contract documents through the use of documentation. Appropriate documentation, including manufacturer's certification, physical tests, visual inspection, and appropriate IDOA report forms are described in the following sections of this report.

### **100.05 DOCUMENTATION**

Documentation is considered complete when compliance with contract documents can be verified. Documentation is provided either by Source Inspection or Jobsite Inspection.

1. Source Inspection (Approved Source) is performed by Illinois Department of Transportation (IDOT) inspectors. Source inspection is accomplished by inspection and/or testing, and is verified by certification.

2. Jobsite Inspection is accomplished by sampling and testing, by collection of a manufacturer's certification or by visual inspection.

### **100.10 DEFINITIONS**

1. Illinois Division of Aeronautics (IDOA) - The Illinois Department of Transportation-Division of Aeronautics and its personnel shall be referred to throughout this manual as IDOA.

2. Illinois Division of Highways (IDOH) - The Illinois Department of Transportation-Division of Highways personnel shall be referred to throughout this manual as IDOH.

3. District - A subdivision of IDOH. Nine (9) districts are present within the Division of Highways.

4. Consultant - The designated engineering firm responsible for administration of the project and inspecting the Contractor's work.

5. Project Engineer - The representative of the Consultant acting as the immediate supervisor of the Resident Engineer.

6. Resident Engineer - The representative of the Consultant who provides field administration and inspection for the project. The Resident Engineer is under the direct supervision of the Project Engineer.

7. Central Laboratory - The IDOT-Bureau of Materials and Physical Research Laboratory, located in Springfield, or the Branch Laboratory, located in Chicago.

8. District Laboratory - A laboratory within and under the supervision of the District.

9. Consultant Testing Laboratory - A laboratory, either owned by or subcontracted by the Consultant. The Consultant Testing Laboratory can be on-site or off-site, and is engaged in the physical testing and/or inspection of materials delivered to the project.

10. Contract Documents - The plans, specifications and special provisions that describe the scope of work of the project and the materials to be used.

11. Certified Project – An airport improvement project for which the materials used to construct the project have been reviewed, accepted, and approved by the State of Illinois, Department of Transportation, Division of Aeronautics as demonstrated by the completion and signing of the Project Material Certification Report.

#### 100.15 REPORTING SYSTEMS

1. IDOT System - The IDOH utilizes the Materials Integrated System for Test Information and Communication (MISTIC). Reports generated through this system are a primary source of documentation for materials tested and inspected for use in IDOH projects.

2. IDOA System - For materials that are compatible with the IDOT Standard Specifications for Road and Bridge Construction, reports generated through the MISTIC system are acceptable as a source of materials documentation. For materials that are not compatible with the above referenced specifications, the Consultant Testing Laboratories shall perform the required testing at the specified frequency. The test/inspection reports shall be submitted with the Materials Documentation Report on IDOA provided forms.

#### 100.20 CLASSIFICATIONS OF SAMPLES AND TESTS

The following definitions and explanations are provided to standardize and clarify the use of terminology related to sampling, testing, and inspection. The letters enclosed in parenthesis are to be used in the “Inspect. Data” line on form AER M-5.

1. Visual (VIS) - Visual inspection is the acceptance or rejection of materials based on appearance and dimensions. Visual inspection typically includes a statement regarding the physical condition of the materials at the time of installation, and documentation of any manufacturer’s markings that would indicate the physical properties of the material being inspected.

Visual inspection is performed when sampling or destructive testing is impractical, or when test methods are unavailable for use. In addition, with the approval

of the IDOA Engineer of Materials, visual inspection may be used to accept small materials quantities from reputable sources.

2. Manufacturer's Certification (CRT) - A manufacturer's certification is a written statement from the manufacturer or producer that indicates that the materials supplied to the project are in compliance with contract documents. The manufacturer's certification must represent the materials being accepted. Acceptance or approval of the material is based on the manufacturer's certification statement. Normally, a visual inspection of the material is also implied. In those cases where a visual inspection is not applicable, the individual who examined the certification will be recorded as the inspector.

3. Acceptance (ACC) - Acceptance/rejection of material for use on a specific project and/or unassigned stock for future use on specific projects. The quantity represented by acceptance samples must be given. ACC is not to be used on M-5 reports.

4. Resample (RES) - An additional or follow-up sample of material previously sampled and/or tested; (1) when the original sample is lost, contaminated, or damaged, or (2) when test procedure or equipment is suspect, or (3) to investigate a failing test. RES is not to be used on M-5 reports.

5. Investigation (INV) - A test which is normally performed by project personnel to verify acceptability of source inspected material. INV tests are verification/check tests. These samples may also be taken to determine the serviceability/performance of in-place materials, or to investigate the reason materials have failed to perform as expected. INV is not to be used on M-5 reports.

6. Process Control (PRO) - Producer's/contractor's tests for the purpose of controlling production of material proposed for incorporation into a project. PRO is not to be used on M-5 reports.

7. Preliminary (PRE) - Samples taken by the producer, IDOT, or a representative of the IDOA, and tested in advance of the use of material to determine its suitability for a particular purpose. Examples - testing new materials or sources, developing new or modified test methods or specifications, and adjusting start-up production to specifications. The fact that a material is shown to be satisfactory by a preliminary test, however, does not guarantee acceptance of future shipments representing the same material from the source tested. PRE is not to be used on M-5 reports.

#### 100.25 ACCEPTANCE SAMPLES AND TESTS

Acceptance samples and tests are all the samples and tests used for determining the quality, workmanship and acceptability of the materials which have been or are being incorporated in the project. The day-to-day inspection of materials is handled in 3 ways:

1. SOURCE INSPECTION - Source inspection is performed by IDOT personnel and involves random sampling or visual inspection at the source of supply. Source

inspection is used when the quantity of material being supplied to a project is large and incorporation into the project is expected to take a substantial amount of time. Materials which have been source inspected may display the "ILL OK" stamp or be accompanied by IDOT Form LA-15 (Supplier's Certification of Shipment of Approved Materials). An LA-15 is acceptable only when it contains all pertinent information. The supplier information, contractor, MISTIC contract number, invoice, material code, producer/location, lot/batch or test ID, quantity, unit, and signature of supplier representative are all information needed to properly assign inspected material from the source.

2. CERTIFIED SOURCE - A producer can be designated as a Certified Source following a comprehensive sampling and testing program performed by IDOT personnel. The IDOT Bureau of Materials and Physical Research publishes a list of Certified Sources. These lists are available through the IDOA or on the internet at <http://www.dot.state.il.us/materials/materialslist.html>. If a producer is "decertified" an updated list on the internet will notify the Consultant. Once a producer has been certified to manufacture or produce specified products, the materials can be incorporated into the project without additional acceptance testing.

3. JOBSITE INSPECTION - Jobsite inspection is the sampling of materials by project personnel at the project location. Testing is performed at the Consultant Testing Laboratory, the Central Laboratory or the District Laboratory. Periodic jobsite inspection is performed to verify the uniformity of a material, the reliability of the delivery system, or the testing/inspection techniques of inspectors located at the material source. In addition, jobsite inspection can be used when visual inspection reveals that a material is in unsatisfactory condition, when previously approved materials have been in storage for a long period of time, or when materials have been stored such that physical deterioration or contamination has occurred.

## **SECTION 200. - RESPONSIBILITIES OF THE RESIDENT ENGINEER**

### 200.01 GENERAL

The Resident Engineer is the on-site representative of the Consultant, sponsor, IDOA and the FAA, and is in direct charge of construction inspection. The duty of the resident engineer, as related to materials, is to assure that the materials incorporated into the project are in compliance with the plans, specifications, and special provisions. It is understood that the resident engineer might not be able to perform inspection of all materials personally; however, it is the resident engineer's responsibility to ensure that all materials are either inspected, tested, and approved by IDOT, or accompanied by proper manufacturer's certification.

### 200.05 DUTIES

1. As soon as the contractor has supplied the resident engineer with the list of producers/suppliers, the resident engineer shall provide a copy of that list to the IDOA Engineer of Materials.

2. For materials that require source inspection, the resident engineer shall notify the IDOA Engineer of Materials so that proper inspection/approval arrangements may be made.

3. The resident engineer shall ensure that the required sampling and testing performed by project personnel and by Consultant Laboratories are done in accordance with ASTM procedures.

4. The resident engineer shall obtain the required proof of compliance (manufacturer's certification, LA-15, test results, etc.) prior to incorporation of a material into the project.

5. The resident engineer shall submit materials documentation, as the project progresses, in a timely manner. See the Material Documentation Requirements section for submittal requirements for each pay item.

6. Force Account Work and Agreed Price Pay Items-- Inspection documentation requirements for materials incorporated into force account and agreed price pay items are the same as for standard contract pay items. If the materials used in the force account work or agreed price pay items do not exist in the standard contract, then the Standard Specifications for Construction of Airports shall govern quality of the materials unless amended by supplemental specifications.

## **SECTION 300. - RESPONSIBILITIES OF THE CONTRACTOR**

### **300.01 GENERAL**

It is the responsibility of the contractor to supply materials and to perform work in accordance with the contract documents and the Standard Specifications for Construction of Airports. To achieve this, the contractor is expected to work in close cooperation with the resident engineer and the producer/supplier.

### **300.05 DUTIES**

1. A minimum of two weeks prior to incorporation into the project, the contractor shall furnish the Resident Engineer information regarding the source of materials to be used.

2. For materials that can be IDOT source inspected, the contractor shall notify the producer/supplier that the materials shall be shipped with evidence of IDOT inspection.

3. The contractor shall provide the producer/supplier with the MISTIC contract number, the material specification requirements, and the type of construction for which the material is being supplied. The supplier shall be informed that this information should appear on the delivery tickets.

4. The contractor shall order materials far enough in advance so that IDOT inspectors can inspect and approve the materials prior to delivery to the project.

## **SECTION 400. - MATERIALS DOCUMENTATION**

### **400.01 DEFINITION**

As previously discussed, it is the responsibility of the resident engineer to inspect the materials delivered to the project and to ensure that they are in conformance with contract documents. This is accomplished by source or jobsite inspection. Material documentation is made up of the sampling and testing records, certifications, etc., required to verify that a material conforms to the contract documents.

### **400.02 PURPOSE**

The purpose of materials documentation is to provide a record of the inspection and construction procedures followed by the contractor, and to document compliance or noncompliance of a material with contract documents. In addition, materials documentation is the foundation for the acceptance of the Project Materials Certification Report.

### **400.05 REPORTING**

Materials inspected and tested by IDOT personnel are usually incorporated into the MISTIC system. Reports generated through the MISTIC system will be available to the IDOA Materials Section and will serve as documentation for those materials. For materials delivered to the project accompanied by IDOT form LA-15, the resident engineer should submit copies of these forms to the IDOA Materials Section.

Materials inspected and tested by consultant project personnel and consultant laboratories will be reported to the IDOA Materials Section by the resident engineer at the specified frequency on IDOA provided forms.

### **400.10 EXCEPTIONS AND NON-CERTIFIED MATERIALS**

Exceptions and Non-Certified Materials are listed in the Material Certification and are defined as follows:

1. An Exception is any material that has been accepted by the IDOA, but does not meet the specification requirements. To be considered an Exception, the IDOA must determine that the material will perform as intended. An Exception can be a material that has received less than the required amount of testing or manufacturer's certification. It can also be bituminous concrete or Portland cement concrete that has pay penalties, or it can be a material that IDOA decides to accept with a credit from the contractor.

2. A Non-Certified Material is any material that does not have a manufacturer's certification (or evidence of IDOT inspection) indicating that it meets the contract specifications. Non-Certified Materials should not intentionally be installed in airport construction projects.

### **400.15 PROJECT DOCUMENTATION AND TESTING REQUIREMENTS**

The Project Documentation and Testing Requirements Report is a summary of the required materials certification items listed in the Manual for Documentation of Airport Materials. If conflicts arise between the two documents, the Manual shall always take precedence. The items listed in the Manual and in the Project Documentation and Testing Requirements Report shall be the basis for accepting project materials and completing the Material Certification Report for a project. All materials reported by the Consultant as acceptable shall be reviewed for compliance by the Engineer of Materials.

#### 400.20 MATERIAL TESTING AND DOCUMENTATION REQUIREMENTS BY PAY ITEM

##### 1. Item 152 Excavation and Embankment

###### A. Moisture-Density Relationship (Proctor)

- 1) Test Procedure
  - a) ASTM D698 or ASTM D1557.
- 2) Test Frequency
  - a) One for each soil type.
- 3) Report
  - a) Test results from the testing laboratory.

###### B. Density

- 1) Test Procedure
  - a) ASTM D1556, ASTM D2167 or ASTM D2922.
- 2) Test Frequency
  - a) One test/1500 SY of excavation.
  - b) One test /8" lift of embankment or one test /1000 cubic yards of embankment, whichever is more frequent.
- 3) Report
  - a) Submit density test results on Form AER M-17 or AER M-18.
  - b) Any failing tests should be highlighted and retested following additional compactive effort. The retest should be clearly marked.

##### 2. Item 155 Lime Treated Subgrade

###### A. Lime Acceptance

- 1) Test Procedure
  - a) Approved source
- 2) Test Frequency
  - a) One for each source of lime.
- 3) Report
  - a) Form AER M-5.

###### B. Moisture-Density Relationship (Proctor)

- 1) Test Procedure
  - a) ASTM D698 or ASTM D1557.
- 2) Test Frequency
  - a) One for each soil type.
- 3) Report
  - a) Test results from the testing laboratory.

#### C. Density

- 1) Test Procedure
  - a) ASTM D1556, ASTM D2167 or ASTM D2922.
- 2) Test Frequency
  - a) One test/1500 SY of lime treated subgrade.
- 3) Report
  - a) Submit density test results: Form AER M-17 or Division of Highways equivalent
  - b) Any failing tests should be highlighted and retested following additional compactive effort. The retest should be clearly marked.

### 3. Item 201 Bituminous Base Course

#### A. Aggregate Acceptance

- 1) Quality
  - a) Test Procedures
    - 1] Approved source (ASTM C131 and ASTM C88).
  - b) Test Frequency
    - 1] One/source/aggregate
  - c) Report
    - 1) A certification from the quarry for the total quantity of aggregate listing the source, gradation type, and quality designation of aggregate shipped (Aggregate Certification of Compliance form may be used: see Attachment 4)
- 2) Stockpile Gradation
  - a) Test Procedure
    - 1] ASTM C136
  - b) Test Frequency
    - 1] One/aggregate/source prior to production.
    - 2] One/aggregate/week during production for batch plant, one/aggregate/day during production or every 1000 tons for drum plant
  - c) Report
    - 1] Retain the gradation reports in the resident engineer's project file

#### B. Filler Acceptance

- from the
- 1) Quality
    - a) Test Procedures
      - 1] Approved source (ASTM D242).
    - b) Test Frequency
      - 1] One/source
    - c) Report
      - 1] The resident engineer should verify that the filler is from the approved source. If the filler is source, no report is required.
  - 2) Gradation
    - a) Test Procedures
      - 1] ASTM C136
    - b) Test Frequency
      - 1] One/source prior to production.
      - 2] One/week during production for both drum and batch plants.
    - c) Report
      - 1] Retain gradation reports in the resident engineer's job files

#### C. Asphalt Cement Acceptance

- 1) Test Procedure
  - a) IDOT Certified Source (ASTM D3381)
- 2) Test Frequency
  - a) One/source
- 3) Report
  - a) The resident engineer shall collect shipping tickets, which shall list the source and type of asphalt shipped, to be submitted to I.D.A. at the end of the project.
  - b) If the asphalt material is from the approved source, no report is required.

#### D. Plant Approval

- 1) Test Procedure
  - a) Inspection by IDOA Materials Section or IDOT Division of Highways inspector.
  - b) Plant must be approved for IDOT Class I mix production.
- 2) Test Frequency
  - a) Existing Plants
    - 1] Plant approval every 5 years.
    - 2] Scale calibration annually.
  - b) Mobile Plants
    - 1] Plant approval following plant setup.
    - 2] Scale calibration following plant setup.
- 3) Report

a) Plant survey form will be completed by IDOA Materials Section or IDOT inspector. No additional reports are required.

#### E. Mix Approval

##### 1) Mix Design

###### a) Test Procedure

1] Asphalt Institute Manual S-2.

###### b) Test Frequency

1] One/project/aggregate combination

###### c) Report

1] IDOA Materials Section shall prepare the mix designs. The contractor shall do the mix design laboratory testing and submit the results to the Engineer of Materials.

##### 2) Proportioning

###### a) Test Procedure

1] IDOT Bituminous Proportioning Manual

###### b) Test Frequency

###### 1] Batch Plants

a] One (1) complete hot bin per day of production or every 1,000 tons, whichever is more frequent.

b] One stockpile gradation for each aggregate per week

###### 2] Drum Plants

a] One (1) combined belt analysis per day of production or every 1,000 tons, whichever is more frequent.

b] Minimum of one (1) gradation for each aggregate per day of production or every 1,000 tons

###### c) Report

1] Form AER M-9 or MI-305 (Division of Highways equivalent) sent to the I.D.A. Materials Section at the end of the project.

2] Form AER M-14 sent to the I.D.A. Materials Section at the end of each day's production.

##### 3) Marshall Properties

###### a) Test Procedure

1] ASTM D1559, ASTM D2726

###### b) Test Frequency

1] One/1000 tons

###### c) Report

- 1] Form AER M-14 Bituminous Summary Form sent to the I.D.A. Materials Section at the end of each day's production.
  - 2] Division of Highways Form MI-308 or test procedure worksheets sent to the I.D.A. Materials Section at the end of the project.
- 4) Extraction
  - a) Test Procedure
    - 1] ASTM D2172, ASTM C136
    - 2] In place of the extraction test, the Contractor may provide the asphalt content by a nuclear asphalt gauge, along with a calibrated ignition oven test (gradation only) using the IDOT Division of Highways' latest procedure.
  - b) Test Frequency
    - 1] One/1000 tons
  - c) Report
    - 1] Form AER M-14 Bituminous Summary Form sent to the I.D.A. Materials Section at the end of each day's production.
    - 2] Form AER M-11 Bituminous Mixtures Extraction or Div. Of Highways MI-308 sent to the I.D.A. Materials Section at the end of the project.
- 5) Air Voids
  - a) Test Procedure
    - 1] ASTM D2041, D3203
  - b) Test Frequency
    - 1] One/1000 tons
  - c) Report
    - 1] Form AER M-14 Bituminous Summary Form sent to the I.D.A. Materials Section at the end of each day's production.
    - 2] Division of Highways Form MI-308 or test procedure worksheets sent to the I.D.A. Materials Section at the end of the project.
- 6) Density
  - a) Projects with less than 2500 tons/location of bituminous mix.
    - 1] Test Procedure
      - a] ASTM D2950, ASTM D2041, ASTM D2726
    - 2] Test Frequency
      - a] Two random density tests/500 tons of bituminous mix placed (each random test consists of the average of five nuclear

density tests taken across the width of the paving lane)

3] Report

a] Form AER M-16

b) Projects with 2500 tons/location or more of bituminous mix.

1] Test Procedure

a] ASTM D2726, ASTM D2041, ASTM D2950

2] Test Frequency

a] The bituminous mix shall be tested on a lot basis. A lot shall consist of a minimum of three sublots, but not exceed six sublots.

b] A subplot consists of 500 tons of bituminous mix placed.

c] One density sample shall be taken randomly from each subplot. Each density test shall be the average of two cores per sample location.

3] Report

a] Form AER M-10 Bituminous Core Density Testing

b] Form AER M-1 Acceptance Testing for Density Bituminous Mixes.

c] Form AER M-2 Mean and Standard Deviation Test for Outliers

d] Form AER M-14 Bituminous Summary Form

7) Maximum Specific Gravity,  $G_{mm}$  ("D")

a) Test Procedure

1] Illinois Modified Test Procedure of AASHTO T219-94

2] Illinois Modified AASHTO T-166

b) Test Frequency

1] One per day

c) Report

1] Lab Report for Maximum Specific Gravity,  $G_{mm}$  ("D")

4. Item 208 Aggregate Base Course

A. Aggregate Acceptance

1) Quality

a) Test Procedures

1] Approved source (ASTM C131).

- a] The resident engineer shall get approval from the I.D.A. Materials Section prior to its installation.
  - b) Test Frequency
    - 1] One/source
  - c) Report
    - 1] The resident engineer should verify that the aggregate is from the approved source. If the aggregate is from the approved source, no additional report is required for quality.
- 2) Gradation
  - a) Test Procedures
    - 1] ASTM C136, ASTM C117
  - b) Test Frequency
    - 1] One/10,000 tons done by Contractor
  - c) Report
    - 1] Form AER M-5.
    - 2] The resident engineer shall collect the weigh tickets for the project files.
    - 3] The resident engineer should verify that the gradation is within the specified limits. All gradation results shall be submitted to IDA at the end of the project

#### B. Compaction

- 1) Moisture-Density Relationship (Proctor)
  - a) Test Procedure
    - 1] ASTM D698 or ASTM D1557.
  - b) Test Frequency
    - 1] One/aggregate/source.
  - c) Report
    - 1] Test results from the testing laboratory.
- 2) Density
  - a) Test Procedure
    - 1] ASTM D1556, ASTM D2167 or ASTM D2922
  - b) Test Frequency
    - 1] One/1500 SY/lift
  - c) Report
    - 1] Form AER M-17 or Form AER M-18

#### 5. Item 209 Crushed Aggregate Base Course

##### A. Aggregate Acceptance

- 1) Quality
  - a) Test Procedures
    - 1] Approved source (ASTM C131).

- a] The resident engineer shall get approval of the aggregate from the IDA Materials Section prior to its installation.
  - b) Test Frequency
    - 1] One/source
  - c) Report
    - 1] The resident engineer should verify that the aggregate is from the approved source. If the aggregate is from the approved source, no additional report is required for quality.
- 2) Gradation
  - a) Test Procedures
    - 1] ASTM C136, ASTM C117
  - b) Test Frequency
    - 1] One/ 10,000 tons done by Contractor
  - c) Report
    - 1] Form AER M-5.
    - 2] The resident engineer shall collect the weigh tickets for the project files.
    - 3] Gradation Analysis shall be completed and submitted to the Resident Engineer by the Contractor.
    - 4] The resident engineer should verify that the gradation is within the specified limits. All gradation results shall be then submitted to I.D.A.

#### B. Compaction

- 1) Moisture-Density Relationship (Proctor)
  - a) Test Procedure
    - 1] ASTM D698 or ASTM D1557.
  - b) Test Frequency
    - 1] One/aggregate/source.
  - c) Report
    - 1] Test results from the testing laboratory.
- 2) Density
  - a) Test Procedure
    - 1] ASTM D1556, ASTM D2167 or ASTM D2922
  - b) Test Frequency
    - 1] One/1500 SY/lift
  - c) Report
    - 1] Form AER M-17 or Form AER M-18

### 6. Item 401 Bituminous Surface Course

#### A. Aggregate Acceptance

- 1) Quality
  - a) Test Procedures

- 1] Approved source (ASTM C131 and ASTM C88).
- b) Test Frequency
  - 1] One/source/aggregate
- c) Report
  - 1) A certification from the quarry for the total quantity of aggregate listing the source, gradation type, and quality designation of aggregate shipped (Aggregate Certification of Compliance form may be used: see Attachment 4)
- 2) Stockpile Gradation
  - a) Test Procedure
    - 1] ASTM C136
  - b) Test Frequency
    - 1] One/aggregate/source prior to production.
    - 2] One/aggregate/week during production for batch plants, one/aggregate/day during production or every 1000 tons for drum plants
  - c) Report
    - 1] Retain stockpile gradation results in the resident engineer's project file.

#### B. Filler Acceptance

- 1) Quality
  - a) Test Procedures
    - 1] Approved source (ASTM D242).
  - b) Test Frequency
    - 1] One/source
  - c) Report
    - 1] The resident engineer should verify that the filler is from the approved source. If the filler is approved source, no report is required.

- 2) Gradation
  - a) Test Procedures
    - 1] ASTM C136
  - b) Test Frequency
    - 1] One/source prior to production.
    - 2] One/week during production for both drum and batch plants
  - c) Report
    - 1] Retain gradation results in the resident engineer's project file.

#### C. Asphalt Cement Acceptance

- 1) Test Procedure

- a) IDOT Certified Source (ASTM D3381)
- 2) Test Frequency
  - a) One/source
- 3) Report
  - a) The resident engineer shall collect shipping tickets that shall list the source and type of asphalt shipped, to be submitted to I.D.A. at the end of the project
  - b) If the asphalt material is from the approved source, no report is required.

#### D. Plant Approval

- 1) Test Procedure
  - a) Inspection by IDOA Materials Section or IDOT Division of Highways inspector.
  - b) Plant must be approved for IDOT Class I mix production.
- 2) Test Frequency
  - a) Existing Plants
    - 1] Plant approval every 5 years.
    - 2] Scale calibration annually.
  - b) Mobile Plants
    - 1] Plant approval following plant setup.
    - 2] Scale calibration following plant setup.
- 3) Report
  - a) Plant survey form will be completed by IDOA Materials Section or IDOT inspector. No additional reports are required.

#### E. Mix Approval

- 1) Mix Design
  - a) Test Procedure
    - 1] Asphalt Institute Manual S-2.
  - b) Test Frequency
    - 1] One/project/aggregate combination
  - c) Report
    - 1] IDOA Materials Section shall prepare the mix designs. The contractor shall perform the mix design laboratory testing and submit the results to the Engineer of Materials.
- 2) Proportioning
  - a) Test Procedure
    - 1] IDOT Bituminous Proportioning Manual
  - b) Test Frequency
    - 1] Batch Plants

- a] One (1) complete hot bin per day of production or every 1,000 tons, whichever is more frequent.
    - b] One stockpile gradation for each aggregate per week
  - 2] Drum Plants
    - a] One (1) combined belt analysis per day of production or every 1,000 tons, whichever is more frequent.
    - b] Minimum of one (1) gradation for each aggregate per day of production or every 1,000 tons
- c) Report
  - 1] Form AER M-9 or MI-305 (Division of Highways equivalent) sent to the I.D.A. Materials Section at the end of the project.
  - 2] Form AER M-14 sent to the I.D.A. Materials Section at the end of each day's production.
- 3) Marshall
  - a) Test Procedure
    - 1] ASTM D1559, ASTM D2726
  - b) Test Frequency
    - 1] One/1000 tons
  - c) Report
    - 1] Form AER M-14 Bituminous Summary Form sent to the I.D.A. Materials Section at the end of each day's production.
    - 2] Division of Highways Form MI-308 or test procedure worksheets sent to the I.D.A. Materials Section at the end of the project.
- 4) Extraction
  - a) Test Procedure
    - 1] ASTM D2172, ASTM C136
    - 2] In place of the extraction test, the Contractor may provide the asphalt content by a nuclear asphalt gauge, along with a calibrated ignition oven test (gradation only) using the IDOT Division of Highways' latest procedure.
  - b) Test Frequency
    - 1] One/1000 tons
  - c) Report

- 1] Form AER M-14 Bituminous Summary Form sent to the I.D.A. Materials Section at the end of each day's production.
- 2] Form AER M-11 Bituminous Mixtures Extraction or Div. Of Highways MI-308 sent to the I.D.A. Materials Section at the end of the project.

5) Air Voids

- a) Test Procedure
  - 1] ASTM D2041, D3203
- b) Test Frequency
  - 1] One/1000 tons
- c) Report
  - 1] From AER M-14 Bituminous Summary Form sent to the I.D.A. Materials Section at the end of each day's production.
  - 2] Division of Highways Form MI-308 or test procedure worksheets sent to the I.D.A. Materials Section at the end of the project.

6) Density

- a) Projects with less than 2500 tons/location of bituminous mix.
  - 1] Test Procedure
    - a] ASTM D2950, ASTM D2041, ASTM D2726
  - 2] Test Frequency
    - a] Two random density tests/500 tons of bituminous mix placed (each random test consists of the average of five nuclear density tests taken across the width of the paving lane)
  - 3] Report
    - a] Form AER M-16
- b) Projects with 2500 tons/location or more of bituminous mix.
  - 1] Test Procedure
    - a] ASTM D2726, ASTM D2041, ASTM D2950
  - 2] Test Frequency
    - a] The bituminous mix shall be tested on a lot basis. A lot shall consist of a minimum of three sublots, but not exceed six sublots.
    - b] A sublot consists of 500 tons of bituminous mix placed.
    - c] One density sample shall be taken randomly from each sublot. Each density

test shall be the average of two cores per sample location.

3] Report

- a] Form AER M-10 Bituminous Core Density Testing
- b] Form AER M-1 Acceptance Testing for Density Bituminous Mixes.
- c] Form AER M-2 Mean and Standard Deviation Test for Outliers
- d] Form AER M-14 Bituminous Summary Form

7) Maximum Specific Gravity,  $G_{mm}$  ("D")

a) Test Procedure

- 1] Illinois Modified Test Procedure of AASHTO T219-94
- 2] Illinois Modified AASHTO T-166

b) Test Frequency

- 1] One per day

c) Report

- 1] Lab Report for Maximum Specific Gravity,  $G_{mm}$  ("D")

7. Item 402 Porous Friction Course

A. Aggregate Acceptance

1) Quality

a) Test Procedures

- 1] Approved source (ASTM C131 and ASTM C88).

b) Test Frequency

- 1] One/source/aggregate

c) Report

- 1] A certification from the quarry for the total quantity of aggregate listing the source, gradation type, and quality designation of aggregate shipped (Aggregate Certification of Compliance form may be used: see Attachment 4)

2) Stockpile Gradation

a) Test Procedure

- 1] ASTM C136

b) Test Frequency

- 1] One/aggregate/source prior to production.
- 2] One/aggregate/week during production for batch plant, one/aggregate/day during production or every 1000 tons for drum plant.

c) Report

1] Retain gradation reports in the resident engineer's project file.

#### B. Filler Acceptance

##### 1) Quality

###### a) Test Procedures

1] Approved source (ASTM D242).

###### b) Test Frequency

1] One/source

###### c) Report

1] The resident engineer should verify that the filler is from the approved source. If the filler is approved source, no report is

from the  
required.

##### 2) Gradation

###### a) Test Procedures

1] ASTM C136

###### b) Test Frequency

1] One/source prior to production.

2] One/week during production for both drum and batch plants.

###### c) Report

1] Retain gradation reports in the resident engineer's project file.

#### C. Asphalt Cement Acceptance

##### 1) Test Procedure

a) IDOT Certified Source (ASTM D3381)

##### 2) Test Frequency

a) One/source

##### 3) Report

a) The resident engineer shall collect shipping tickets that shall list the source and type of asphalt shipped, to be submitted to I.D.A. at the end of the project

b) If the asphalt material is from the approved source, no report is required.

#### D. Plant Approval

##### 1) Test Procedure

a) Inspection by IDOA Materials Section or IDOT Division of Highways inspector.

b) Plant must be approved for IDOT Class I mix production.

##### 2) Test Frequency

a) Existing Plants

1] Plant approval every 5 years.

- 2] Scale calibration annually.
- b) Mobile Plants
  - 1] Plant approval following plant setup.
  - 2] Scale calibration following plant setup.
- 3) Report
  - a) Plant survey form will be completed by IDOA Materials Section or IDOT inspector. No additional reports are required.

#### E. Mix Approval

- 1) Mix Design
  - a) Test Procedure
    - 1] FHWA Procedure Manual S-2.
  - b) Test Frequency
    - 1] One/project/aggregate combination
  - c) Report
    - 1] IDOA Materials Section shall prepare the mix designs. No additional report is necessary for mix design.
- 2) Proportioning
  - a) Test Procedure
    - 1] IDOT Bituminous Proportioning Manual
  - b) Test Frequency
    - 1] Batch Plants
      - a] One (1) complete hot bin per day of production or every 1,000 tons, whichever is more frequent.
      - b] One stockpile gradation for each aggregate per week
    - 2] Drum Plants
      - a] One (1) combined belt analysis per day of production or every 1,000 tons, whichever is more frequent.
      - b] Minimum of one (1) gradation for each aggregate per day of production or every 1,000 tons
  - c) Report
    - 1] Form AER M-9 or Division of Highways MI-305 sent to the I.D.A. Materials Section at the end of the contract.
    - 2] Form AER M-14 sent to the I.D.A. Materials Section at the end of each day's production.
- 3) Extraction
  - a) Test Procedure
    - 1] ASTM D2172, ASTM C136

2] In place of the extraction test, the Contractor may provide the asphalt content by a nuclear asphalt gauge, along with a calibrated ignition oven test (gradation only) using the IDOT Division of Highways' latest procedure

b) Test Frequency

1] One/500 tons

c) Report

1] Form AER M-14 Bituminous Summary Form sent to the I.D.A. Materials Section at the end of each day's production.

2] Form AER M-11 or Division of Highways MI-308 sent to the I.D.A. Materials Section at the end of the project.

8. Item 501 Portland Cement Concrete Pavement

A. Aggregate Acceptance

1) Quality

a) Test Procedure

1] Approved Source. The source must be IDOT approved for production of non- "D" Cracking aggregate (ASTM C131 and ASTM C88).

b) Test Frequency

1] One/source/aggregate

c) Report

1] The resident engineer should verify that the aggregate is from the approved source. The Resident Engineer should obtain a certification stating the aggregate is Class A quality/non- "D" Cracking and from which ledge it was produced. (Aggregate Certification of Compliance form may be used: see Attachment 4)

2) Stockpile Gradation

a) Test Procedure

1] ASTM C136, ASTM C33

b) Test Frequency

1] One/aggregate/source prior to production.

2] Two/aggregate/day during production.

c) Report

1] Form AER M-12 to be sent to the I.D.A. Materials Section at the end of the project.

B. Cement/Flyash/Ground Granulated Blast Furnace Slag (GGBFS)  
Acceptance

1) Test Procedure

a) IDOT Approved List (ASTM C150)

- 2) Test Frequency
  - a) One/source
- 3) Report
  - a) The resident engineer should verify that the cement /flyash/GGBFS is from the approved source indicated on the approved Job Mix Formula (JMF). If the cement is from the approved source indicated on the approved JMF, no report is required.
  - b) Cement/flyash/GGBFS tickets should be checked daily by R.E. and maintained daily in the Resident Engineer's project file.

#### C. Admixture Acceptance

- 1) Air Entraining Agent
  - a) Test Procedure
    - 1] IDOT Approved List (ASTM C260)
  - b) Frequency
    - 1] One/source
  - c) Report
    - 1] The resident engineer should verify that the admixture is from the approved source. If the admixture is from the approved source, no report is required. However, tickets should be checked and maintained daily in the project file.
- 2) Water Reducer
  - a) Test Procedure
    - 1] IDOT Approved List (ASTM C494, Type A or D)
  - b) Frequency
    - 1] One/source
  - c) Report
    - 1] The resident engineer should verify that the admixture is from the approved source. If the admixture is from the approved source, no report is required. However, tickets should be checked and maintained daily in the project file.

#### D. Joint Filler Acceptance

- 1) Test Procedure
  - a) Manufacturer's Certification (ASTM D1751)
- 2) Test Frequency
  - a) One/source
- 3) Report
  - a) Form AER M-5 with a copy of the manufacturer's certification attached.

#### E. Joint Sealer Acceptance

- 1) Test Procedure
  - a) Manufacturer's Certification
- 2) Test Frequency
  - a) One/source
- 3) Report
  - a) Form AER M-5 with a copy of the manufacturer's certification attached.

#### F. Steel Reinforcement Acceptance

- 1) Test Procedure
  - a) Black Bars: IDOT Approved Producer, ASTM A185, ASTM A497, ASTM A615, ASTM A616, ASTM A184, ASTM A704 (Mill analysis reports)
  - b) Epoxy Coated Bars: IDOT Approved Producer, CRSI Certified Plant for epoxy coating, AASHTO M284, ASTM A185, ASTM A497, ASTM A615, ASTM A616, ASTM A184, ASTM A704 (Mill analysis reports)
- 2) Test Frequency
  - a) One/source
- 3) Report
  - a) Form AER M-5 with copy of mill analysis attached (and epoxy coating certification, if required) indicating 100% domestic steel used.

#### G. Dowel Bars

- 1) Test Procedure
  - a) IDOT Approved Producer, ASTM A615, ASTM A616, ASTM A617, AASHTO M227 Grades 70 thru 80, AASHTO M254 (Mill analysis reports)
  - b) Basket Assemblies – IDOT Approved Producer, AASHTO M-32
- 2) Test Frequency
  - a) One/source
- 3) Report
  - a) Form AER M-5 with copy of mill analysis attached and indicating 100% domestic steel used.
  - b) Epoxy coating or other coating certification, if required

#### H. Curing Compound

- 1) Test Procedure
  - a) Manufacturer's certification (ASTM C309, Type 2)
- 2) Test Frequency
  - a) One/source
- 3) Report
  - a) Form AER M-5 with manufacturer's certification

## I. Plant Approval

- 1) Test Procedure
  - a) Inspection by IDOA Materials Section or IDOT Division of Highways inspector.
- 2) Test Frequency
  - a) One/plant
- 3) Report
  - a) Plant survey form will be completed by IDOA Materials Section or IDOT inspector. Recent (yearly) scale calibration results will be required.

## J. Test Batch

- 1) Mix Design
  - a) Test Procedure
    - 1] IDOA Design Procedure
  - b) Test Frequency
    - 1] One/project/ingredient combination
  - c) Report
    - 1] IDOA Materials Section shall prepare the mix designs. No additional report is necessary for mix design.
    - 2] Test Batch Documentation Report to be completed by Resident Engineer and submitted to the I.D.A. Materials Section for approval by Engineer of Materials before start of production of mix.
- 2) Proportioning
  - a) Test Procedure
    - 1] Aeronautics Policy Memorandum 87-3
    - 2] Adjust batch weights based on moisture tests for each mix.
    - 3] Verify the contractor's adjusted batch weights for each mix.
  - b) Test Frequency
    - 1] Two moisture tests per aggregate.
  - c) Report
    - 1] Form AER M-6, Form AER M-4, Form AER M-12
- 3) Slump
  - a) Test Procedure
    - 1] ASTM C143
  - b) Test Frequency
    - 1] One/test batch/mix minimum
  - c) Report
    - 1] Form AER M-7 or AER M-15

- 4) Entrained Air
  - a) Test Procedure
    - 1] ASTM C231
  - b) Test Frequency
    - 1] One/test batch/mix minimum
  - c) Report
    - 1] Form AER M-7 or AER M-15
- 5) Strength Specimens
  - a) Curing
    - 1] Test Procedure
      - a] ASTM C31
    - 2] Test Frequency
      - a] One/test batch
    - 3] Report
      - a] None
  - b) Compressive Strength
    - 1] Test Procedure
      - a]ASTM C39
    - 2] Test Frequency
      - a] Two samples each for 3, 7, 14 and 28 day strength/test batch.
    - 3] Report
      - a] Form AER M-8 or AER M-15
  - c) Flexural Strength
    - 1] Test Procedure
      - a]ASTM C78
    - 2] Test Frequency
      - a] Two samples each for 3, 7, 14 and 28 day strength/test batch.
    - 3] Report
      - a] Form AER M-8 or AER M-15

K. Mix Approval (Production Paving)

- 1) Proportioning
  - a) Test Procedure
    - 1] Aeronautics Policy Memorandum 87-3
    - 2] Adjust batch weights based on moisture tests for each mix.
    - 3] Verify the contractor's adjusted batch weights for each mix.
  - b) Test Frequency
    - 1] Minimum two moisture tests/aggregate/day (AM & PM).
  - c) Report

- 1] Form AER M-6, AER M-4, & AER M-12 sent to the I.D.A. Materials Section at the end of the project.
- 2) Slump
  - a) Test Procedure
    - 1] ASTM C143
  - b) Test Frequency
    - 1] Minimum one/300 CY minimum
  - c) Report
    - 1] Form AER M-7 or AER M-15 sent daily to the I.D.A. Materials Section.
- 3) Entrained Air
  - a) Test Procedure
    - 1] ASTM C231
  - b) Test Frequency
    - 1] Minimum one/300 CY minimum
  - c) Report
    - 1] Form AER M-7 sent daily to the I.D.A. Materials Section.
- 4) Strength Specimens
  - a) Curing
    - 1] Test Procedure
      - a] ASTM C31
    - 2] Test Frequency
      - a] One/project
    - 3] Report
      - a] None
  - b) Compressive Strength
    - 1] Test Procedure
      - a] ASTM C39
    - 2] Test Frequency
      - a] Minimum two samples each for 3, 7, 14 and 28 day strength/300 CY.
    - 3] Report
      - a] Form AER M-8 or AER M-15 sent to the I.D.A. Materials Section when updated with strength data.
  - c) Flexural Strength
    - 1] Test Procedure
      - a] ASTM C78
    - 2] Test Frequency
      - a] Minimum two samples each for 3, 7, 14 and 28 day strength/300 CY.
    - 3] Report

a] Form AER M-8 or AER M-15 sent to the I.D.A. Materials Section when updated with strength data.

9. Item 602 Bituminous Prime Coat

A. Bituminous Material

1) Test Procedure

a) IDOT Certified Source (ASTM 2026, ASTM 2027 or ASTM 2028)

2) Test Frequency

a) One/source

3) Report

a) Form AER M-5

10. Item 603 Bituminous Tack Coat

1) Test Procedure

a) IDOT Certified Source (ASTM 2026, ASTM 2027 or ASTM 2028)

2) Test Frequency

a) One/source

3) Report

a) Form AER M-5

11. Item 609 Seal Coats and Bituminous Surface Treatments

A. Aggregate

1) Test Procedure

a) Approved Source (ASTM C131)

b) Gradation (ASTM C117, ASTM C136)

2) Test Frequency

a) One/10,000 tons by Contractor

3) Report

a) Form AER M-5

b) Gradation Worksheet sent to I.D.A.

B. Bituminous Material

1) Test Procedure

a) IDOT Certified Source (ASTM D946)

2) Test Frequency

a) One/project

- 3) Report
  - a) Form AER M-5

12. Item 610 Structural Portland Cement Concrete

A. Aggregate Acceptance

- 1) Quality
  - a) Test Procedures
    - 1] Approved Source. The source must be IDOT approved for production of non-“D” Cracking aggregate (ASTM C131 and ASTM C88).
  - b) Test Frequency
    - 1] One/source/aggregate
  - c) Report
    - 1] The resident engineer should verify that the aggregate is from the approved source. The Resident Engineer should obtain certification stating that the aggregate is non- “D” Cracking and from which ledge it was produced.
- 2) Stockpile Gradation [Stockpile gradations will only be performed when required by the contract (or the Engineer of Materials).]
  - a) Test Procedure
    - 1] ASTM C136, ASTM C33
  - b) Test Frequency
    - 1] One/aggregate/source prior to production
    - 2] Two/aggregate/day during production
  - c) Report
    - 1] Gradation Worksheet, if required

B. Cement/Flyash Acceptance

- 1) Test Procedure
  - a) IDOT Approved List (ASTM C150)
- 2) Test Frequency
  - a) One/source
- 3) Report
  - a) The resident engineer should verify that the cement/flyash is from the approved source. If the

cement/flyash is from the approved source, no report is required.

b) Actual batch weight tickets maintained in the project records and available, if requested.

#### C. Admixture Acceptance

##### 1) Air Entraining Agent

###### a) Test Procedure

1] IDOT Approved List (ASTM C260)

###### b) Frequency

1] One/source

###### c) Report

1] The resident engineer should verify that the admixture is from the approved source. If the admixture is from the approved source, no report is required.

##### 2) Water Reducer

###### a) Test Procedure

1] IDOT Approved List (ASTM C494, Type A or D)

###### b) Frequency

1] One/source

###### c) Report

1] The resident engineer should verify that the admixture is from the approved source. If the admixture is from the approved source, no report is required.

#### D. Joint Filler Acceptance

##### 1) Test Procedure

a) Manufacturer's Certification (ASTM D1751)

##### 2) Test Frequency

a) One/source

##### 3) Report

a) Form AER M-5 with a copy of the manufacturer's certification attached.

#### E. Joint Sealer Acceptance

##### 1) Test Procedure

a) Manufacturer's Certification

2) Test Frequency

a) One/source

3) Report

a) Form AER M-5 with a copy of the manufacturer's certification attached.

#### F. Steel Reinforcement Acceptance

1) Test Procedure

a) IDOT Certified Source (ASTM A615, ASTM A615, ASTM A184, ASTM A185, ASTM A497, ASTM A704, ASTM A616) Mill analysis reports.

2) Test Frequency

a) One/source

3) Report

a) Form AER M-5 with copy of mill analysis attached indicating 100% domestic steel used.

#### G. Curing Compound

1) Test Procedure

a) Manufacturer's certification (ASTM C309, Type 2)

2) Test Frequency

a) One/source

3) Report

a) When required by the Materials Certification Engineer, the resident engineer shall submit Form AER M-5 with manufacturer's certification attached.

#### H. Plant Approval

1) Test Procedure

a) Inspection by IDOA Materials Section or IDOT Division of Highways inspector

2) Test Frequency

a) One/plant

3) Report

a) Plant survey form will be completed by IDOA Materials Section or IDOT inspector. A recent (yearly) report of the scale calibration results will be required.

## I. Mix Approval

### 1) Mix Design

#### a) Test Procedure

- 1] The contractor shall submit a mix design in accordance with Policy Memorandum 96-1 for approval by the Engineer of Materials.
- 2] The contractor can also request to use an IDOT Class SI mix design. The producing plant and its location will be required for approval.

#### b) Test Frequency

- 1] One/project/ingredient combination

#### c) Report

- 1] None

### 2) Proportioning (Proportioning shall be performed by the concrete plant personnel unless otherwise specified in the contract documents.)

#### a) Test Procedure

- 1] IDOT Concrete Proportioning Manual
- 2] Adjust batch weights based on moisture tests for each mix.
- 3] If specified in the contract documents, the resident engineer (or his agent) shall verify the contractor's adjusted batch weights for each mix.

#### b) Test Frequency

- 1] One moisture test/aggregate/day

#### c) Report

- 1] When required by the contract documents or the Engineer of Materials, Forms AER M-6, AER M-4, and AER M-12 shall be submitted to the I.D.A. Materials Section at the end of the project.

### 3) Slump

#### a) Test Procedure

- 1] ASTM C143

#### b) Test Frequency

- 1] One/day minimum and if over 100 CY are placed in a day, it is one/100 CY, unless otherwise specified in the contract documents.

c) Report

- 1] Form AER M-7 submitted with other pay item documentation when completed.

4) Entrained Air

a) Test Procedure

- 1] ASTM C231

b) Test Frequency

- 1] One/day minimum and if over 100 CY are placed in a day, it is one/100 CY, unless otherwise specified in the contract documents.

c) Report

- 1] Form AER M-7 submitted with other pay item documentation when completed.

5) Strength Specimens

a) Curing Strength Specimens

1] Test Procedure

- a] ASTM C31

2] Test Frequency

- a] One/project

3] Report

- a] None

b) Compressive Strength

1] Test Procedure

- a] ASTM C39

2] Test Frequency

- a] One/day minimum and if over 100 CY are placed in a day, it is one/100 CY, unless otherwise specified in the contract documents. A test consists of the average of two cylinders.

3] Report

- a] Form AER M-8 submitted with other pay item documentation when completed.

c) Flexural Strength (If required)

- 1] Test Procedure

a] ASTM C78

2] Test Frequency

a] One/day minimum and if over 100 CY are placed in a day, it is one/100 CY, unless otherwise specified in the contract documents.

3] Report

a] Form AER M-8 submitted with other pay item documentation when completed.

13. Item 620 Pavement Marking

A. Paint

1) Test Procedure

a) Manufacturer's Certification

b) Lot Number and I.D.O.T. Approval Number

2) Test Frequency

a) One/paint

3) Report

a) Form AER M-5 with manufacturer's certification attached.

B. Beads

1) Test Procedure

a) Manufacturer's Certification

b) Lot Number and I.D.O.T. Approval Number

2) Test Frequency

a) One/project

3) Report

a) Form AER M-5 with manufacturer's certification attached.

14. Item 625 Tar Emulsion Protective Seal Coat

A. Aggregate

1) Gradation

a) Test Procedure

1] Approved Source

b) Test Frequency

1] One/10,000 tons/aggregate done by Contractor

- c) Report
  - 1] Form AER M-5
  - 2] Gradation Worksheet sent to I.D.A.

2) Stripping Characteristics

- a) Test Procedure
  - 1] Approved Source (ASTM D1664)
- b) Test Frequency
  - 1] One/project

- c) Report
  - 1] None if the aggregate is from the approved source.
  - 2] Submit test for stripping characteristics if required (Contact IDOA Engineer of Materials).

B. Bituminous Material (Coal-tar pitch emulsion)

- 1) Test Procedure
  - a) IDOT Certified Source
- 2) Test Frequency
  - a) One/source
- 3) Report
  - a) Form AER M-5

15. Item 161 Class C Woven Wire Fence

A. Fabric

- 1) Test Procedure
  - a) Manufacturer's Certification
- 2) Test Frequency
  - a) One/source
- 3) Report
  - a) Form AER M-5 with manufacturer's certification attached, indicating only domestic steel used if steel material is specified.

B. Barbed Wire

- 1) Test Procedure
  - a) Manufacturer's Certification
- 2) Test Frequency
  - a) One/source

3) Report

- a) Form AER M-5 with manufacturer's certification attached, indicating only domestic steel used if steel material is specified.

C. Fence Posts, Gates, Rails, Braces, and Accessories

1) Test Procedure

- a) Manufacturer's Certification

2) Test Frequency

- a) One/source

3) Report

- a) Form AER M-5 for each item (line posts, gateposts, end posts, gates, etc.) with manufacturer's certification attached, indicating only domestic steel used if steel material is specified.

D. Concrete

- 1) See Item 610 Structural Portland Cement Concrete for requirements.

16. Item 162 Class E Chain Link Fence

A. Fabric

1) Test Procedure

- a) Manufacturer's Certification

2) Test Frequency

- a) One/source

3) Report

- a) Form AER M-5 with manufacturer's certification attached, indicating only domestic steel used if steel material is specified.

B. Barbed Wire

1) Test Procedure

- a) Manufacturer's certification

2) Test Frequency

- a) One/source

3) Report

- a) Form AER M-5 with manufacturer's certification attached, indicating only domestic steel used if steel material is specified.

C. Fence Posts, Post Tops/Extensions, Top Rails, Gates, Braces, and Accessories

- 1) Test Procedure
  - a) Manufacturer's certification
- 2) Test Frequency
  - a) One/source
- 3) Report
  - a) Form AER M-5 for each item (line posts, gate posts, end posts, horizontal braces, gates, etc.) with manufacturer's certification attached, indicating only domestic steel used if steel material is specified.

#### D. Tension Wire

- 1) Test Procedure
  - a) Manufacturer's certification
- 2) Test Frequency
  - a) One/source
- 3) Report
  - a) Form AER M-5 with manufacturer's certification attached, indicating only domestic steel used if steel material is specified.

#### E. Concrete

- 1) See Item 610 Structural Portland Cement Concrete for requirements.

### 17. Item 701 Pipe for Storm Sewers and Culverts

#### A. Pipe

- 1) Test Procedure
  - a) Approved Source
  - b) IDOT Certified Source for concrete pipe
- 2) Test Frequency
  - a) One/shipment
- 3) Report
  - a) Form AER M-5 with LA-15 or manufacturer's certification attached. (Certification or LA-15's are not required for concrete pipe).

#### B. Backfill

- 1) Test Procedure
  - a) Compact in accordance with Section 152 Excavation and Embankment.
  - b) Gradation Analysis (ASTM C117, ASTM C136), if specified
- 2) Test Frequency
  - a) One density test/500 SY/6" lift
  - b) Gradation/10,000 tons, if specified, done by the Contractor

- 3) Report
  - a) Form MI 701S or MI 701N: Density testing results
  - b) Gradation Worksheet, if specified, sent to I.D.A.

C. Concrete

- 1) See Item 610 Structural Portland Cement Concrete for requirements.

18. Item 705 Pipe Underdrains for Airports

A. Pipe

- 1) Test Procedure
  - a) Manufacturer's certification
- 2) Test Frequency
  - a) One/source
- 3) Report
  - a) Form AER M-5 with manufacturer's certification attached.

B. Filter Fabric

- 1) Test Procedure
  - a) Manufacturer's certification
- 2) Test Frequency
  - a) One/source
- 3) Report
  - a) Form AER M-5 with manufacturer's certification attached.

C. Porous Backfill

- 1) Test Procedure
  - a) Approved source
  - b) Gradation Analysis (ASTM C117, ASTM C136)
  - c) Compact in accordance with Section 152 Excavation and Embankment.
- 2) Test Frequency
  - a) One per 10,000 tons of material, done by Contractor.
  - b) One density test/500 SY/6" lift
- 3) Report
  - a) Form AER M-5
  - b) Form MI 701S or MI 701N: Density testing results

19. Item 751 Manholes, Catch Basins, Inlets and Inspection Holes

A. Precast Units

- 1) Test Procedure
  - a) Approved Source
  - b) Shop drawings
- 2) Test Frequency

- a) One/shipment
- 3) Report
  - a) Form AER M-5

#### B. Metal Castings

- 1) Test Procedure
  - a) Manufacturer's Certification
- 2) Test Frequency
  - a) One/each type of casting
- 3) Report
  - a) AER M-5 with manufacturer's certification attached, indicating only domestic steel used if steel material is specified.

#### C. Concrete

- 1) See Item 610 Structural Portland Cement Concrete for requirements.

#### D. Backfill

- 1) Test Procedures
  - a) Compact in accordance with Section 152 Excavation and Embankment.
  - b) Gradation Analysis (ASTM C117, ASTM C136), if specified
- 2) Test Frequency
  - a) One density test/500 SY/6" lift
  - b) Gradation/10,000 tons, if specified, done by the Contractor
- 3) Report
  - a) Form MI 701S or MI 701N: Density testing results
  - b) Gradation Worksheet, if specified, sent to I.D.A.

### 20. Item 752 Concrete Culverts, Headwalls, and Misc. Structures

#### A. Precast Units

- 1) Test Procedure
  - a) Approved Source
  - b) Shop drawings
- 2) Test Frequency
  - a) One/shipment
- 3) Report
  - a) Form AER M-5

#### B. Concrete

- 1) See Item 610 Structural Portland Cement Concrete for requirements.

C. Backfill

- 1) Test Procedures
  - a) Compact in accordance with Section 152 Excavation and Embankment.
  - b) Gradation Analysis (ASTM C117, ASTM C136), if specified
- 2) Test Frequency
  - a) One density test/500 SY/6" lift
  - b) Gradation/10,000 tons, if specified, done by Contractor
- 3) Report
  - a) Form MI 701S or MI 701N: Density testing results
  - b) Gradation Worksheet, if specified, sent to I.D.A.

21. Item 901 Seeding

A. Agricultural Lime

- 1) Test Procedure
  - a) Approved Source
- 2) Test Frequency
  - a) One/source
- 3) Report
  - a) Form AER M-5

B. Seed

- 1) Test Procedure
  - a) Certification
  - b) Result of seed analysis signed by registered seed technologist.
- 2) Test Frequency
  - a) One/source
- 3) Report
  - a) Form AER M-5 with certification and seed analysis attached.

C. Fertilizer

- 1) Test Procedure
  - a) Certification of Fertilizer
- 2) Test Frequency
  - a) One/source
- 3) Report
  - a) Form AER M-5 with analysis attached.

22. Item 904 Sodding

A. Sod

- 1) Test Procedure
  - a) Department of Agriculture certificate
  - b) Shipping Tickets

- 2) Test Frequency
  - a) One/source
- 3) Report
  - a) Form AER M-5 with Department of Agriculture certificate attached.

B. Agricultural Lime

- 1) See Item 901 (Seeding) for requirements.

C. Fertilizer

- 1) See Item 901 (Seeding) for requirements.

23. Item 908 Mulching

A. Mulch Material

- 1) Test Procedure
  - a) Visual inspection
  - b) Shipping tickets
  - c) Manufacturer's Certification (for manufactured mulch)
- 2) Test Frequency
  - a) One/shipment
- 3) Report
  - a) Form AER M-5

25. Item 910 Signing

A. Sign

- 1) Test Procedure
  - a) Manufacturer's Certification
- 2) Test Frequency
  - a) One/source
- 3) Report
  - a) Form AER M-5
  - b) Mill certification for sign sheet metal, indicating only domestic steel used if steel material is specified.

B. Metal Posts

- 1) Test Procedure
  - a) Manufacturer's Certification
- 2) Test Frequency
  - a) One/source
- 3) Report
  - a) Form AER M-5
  - b) Manufacturer's certification indicating only domestic steel used if steel material is specified.

C. Reflective Sheeting

- 1) Test Procedure

- a) Manufacturer's Certification
- 2) Test Frequency
  - a) One/source
- 3) Report
  - a) Form AER M-5
  - b) Manufacturer's certification

24. Item 101 Installation of Airport Rotating Beacons

A. Beacon

- 1) Test Procedure
  - a) Approved shop drawings or manufacturer's certification.
- 2) Test Frequency
  - a) One/beacon
- 3) Report
  - a) Form AER M-5 with approved shop drawings or manufacturer's certification attached.

B. Panel Boards and Breakers

- 1) Test Procedure
  - a) Approved shop drawings or manufacturer's certification.
- 2) Test Frequency
  - a) One/project
- 3) Report
  - a) Form AER M-5 with approved shop drawings or manufacturer's certification attached.

C. Weatherproof Cabinets

- 1) Test Procedure
  - a) Approved shop drawings or manufacturer's certification.
- 2) Test Frequency
  - a) One/cabinet
- 3) Report
  - a) Form AER M-5 with approved shop drawings or manufacturer's certification attached.

D. Wire

- 1) Test Procedure
  - a) Manufacturer's certification or approved shop drawings
- 2) Test Frequency
  - a) One/project
- 3) Report
  - a) Form AER M-5 with manufacturer's certification or approved shop drawings attached, indicating only domestic steel used if steel material is specified.

E. Conduit

- 1) Test Procedure
  - a) Manufacturer's certification or approved shop drawings
- 2) Test Frequency
  - a) One/project
- 3) Report
  - a) Form AER M-5 with manufacturer's certification or approved shop drawings attached, indicating only domestic steel used if steel material is specified.

F. Paint (When field painted only)

- 1) Test Procedure
  - a) Manufacturer's certification
- 2) Test Frequency
  - a) One/project
- 3) Report
  - a) Form AER M-5 with manufacturer's certification attached.

25. Item 103 Installation of Airport Beacon Towers

A. Tower

- 1) Test Procedure
  - a) Approved shop drawings or manufacturer's certification.
- 2) Test Frequency
  - a) One/tower
- 3) Report
  - a) Form AER M-5 with approved shop drawings or manufacturer's certification attached, indicating only domestic steel used if steel material is specified.

B. Lightning Rod

- 1) Test Procedure
  - a) Visual Inspection
- 2) Test Frequency
  - a) One/beacon
- 3) Report
  - a) Form AER M-5 with visual inspection attached, indicating only domestic steel used if steel material is specified.

C. Down Conductor

- 1) Test Procedure
  - a) Manufacturer's certification
- 2) Test Frequency
  - a) One/project
- 3) Report

- a) Form AER M-5 with manufacturer's certification attached, indicating only domestic steel used if steel material is specified.

D. Ground Rod

- 1) Test Procedure
  - a) Manufacturer's certification or approved shop drawings
- 2) Test Frequency
  - a) One/project
- 3) Report
  - a) Form AER M-5 with manufacturer's certification or approved shop drawings attached, indicating only domestic steel used if steel material is specified.

E. Paint (When field painted only)

- 1) Test Procedure
  - a) Manufacturer's certification
- 2) Test Frequency
  - a) One/project
- 3) Report
  - a) Form AER M-5 with manufacturer's certification attached.

26. Item 107 Installation of Airport 8-Foot and 12-Foot Wind Cones

A. Wind Cones

- 1) Test Procedure
  - a) Manufacturer's certification or approved shop drawings
- 2) Test Frequency
  - a) One/Wind Cone
- 3) Report
  - a) Form AER M-5 with manufacturer's certification or approved shop drawings attached.

B. Wire

- 1) Test Procedure
  - a) Manufacturer's certification or approved shop drawings
- 2) Test Frequency
  - a) One/project
- 3) Report
  - a) Form AER M-5 with manufacturer's certification or approved shop drawings attached, indicating only domestic steel used if steel material is specified.

C. Conduit

- 1) Test Procedure
  - a) Manufacturer's certification

- 2) Test Frequency
  - a) One/project
- 3) Report
  - a) Form AER M-5 with manufacturer's certification or approved shop drawings attached, indicating only domestic steel used if steel material is specified.

D. Concrete

- 1) See Item 610 Structural Portland Cement Concrete for requirements.

E. Paint (When field painted only)

- 1) Test Procedure
  - a) Manufacturer's certification
- 2) Test Frequency
  - a) One/project
- 3) Report
  - a) Form AER M-5 with manufacturer's certification attached.

27. Item 108 Installation of Underground Cable For Airports

A. Cable

- 1. Test Procedure
  - a) Manufacturer's certification or approved shop drawings
- 2) Test Frequency
  - a) One/project/wire type
- 3) Report
  - a) Form AER M-5 with manufacturer's certification or approved shop drawings attached, indicating only domestic steel used if steel material is specified.

B. Unit Duct

- 1) Test Procedure
  - a) Manufacturer's certification or approved shop drawings
- 2) Test Frequency
  - a) One/project
- 3) Report
  - a) Form AER M-5 with manufacturer's certification or approved shop drawings attached, indicating only domestic steel used if steel material is specified.

C. Bare Copper Counterpoise

- 1) Test Procedure
  - a) Manufacturer's certification or approved shop drawings
- 2) Test Frequency
  - a) One/project

- 3) Report
  - a) Form AER M-5 with manufacturer's certification or approved shop drawings attached.

28. Item 109 Installation of Airport Transformer Vault and Vault Equipment.

A. Electrical Components

- 1) Test Procedure
  - a) Manufacturer's certification or approved shop drawings on major equipment.
- 2) Test Frequency
  - a) One/project
- 3) Report
  - a) Form AER M-5 for each major electrical component with manufacturer's certification or approved shop drawing attached.

B. Concrete

- 1) Test Procedure
  - a) Cast-in-place concrete shall conform to the requirements of Section 610 Structural Portland Cement

Concrete.

- b) Reinforcing steel bars
  - 1] Manufacturer's Certification (ASTM A615)
- c) Precast units
  - 1] Approved source (shop drawings)
- 2) Test Frequency
  - a) One/project
- 3) Report
  - a) Form AER M-5

C. Rigid Steel Conduit

- 1) Test Procedure
  - a) Manufacturer's certification or approved shop drawings
- 2) Test Frequency
  - a) One/project
- 3) Report
  - a) Form AER M-5 with manufacturer's certification or approved shop drawings attached, indicating only domestic steel used.

29. Item 110 Installation of Airport Underground Electrical Duct

A. Steel Conduit

- 1) Test Procedure
  - a) Manufacturer's certification or approved shop drawings
- 2) Test Frequency
  - a) One/project

- 3) Report
  - a) Form AER M-5 with manufacturer's certification or approved shop drawings attached, indicating only domestic steel used.

B. Plastic Conduit

- 1) Test Procedure
  - a) Manufacturer's certification or approved shop drawings
- 2) Test Frequency
  - a) One/project
- 3) Report
  - a) Form AER M-5 with manufacturer's certification or approved shop drawings attached.

C. Concrete For Concrete Encased Duct

- 1) See Item 610 Structural Portland Cement Concrete for requirements.

30. Item 125 Installation of Airport Lighting Systems

A. Electrical Equipment

- 1) Test Procedure
  - a) Manufacturer's certification or approved shop drawings.
- 2) Test Frequency
  - a) One/project
- 3) Report
  - a) Form AER M-5 for each major electrical component with manufacturer's certification or approved shop drawings attached.

B. Cans

- 1) Test Procedure
  - a) Manufacturer's certification or approved shop drawings.
- 2) Test Frequency
  - a) One/project
- 3) Report
  - a) Form AER M-5 with manufacturer's certification or approved shop drawings attached, indicating only domestic steel used if steel material is specified.

C. Concrete

- 1) See Item 610 Structural Portland Cement Concrete for requirements.

400.25 INSTRUCTIONS FOR FILLING OUT M-5 VISUAL INSPECTION REPORT

## REQUIRED FIELDS

- (1) PRODUCER NO: The numeric code for the material producer (not supplier) is in the format 99999-99, 9999-99, 999-99. Obtained from the MISTIC code book under the section entitled “ACTIVE MISTIC PRODUCER/SUPPLIER CODES (Alphabetic)”.
- (2) INSPECTOR NO: Consultant Tax Number. Should be of the format 999999999. Tax numbers less than nine digits long should be left justified and right filled with zeros. Example: (123450000) for tax number 12345.
- (3) DATE: Normally the date the material arrived on the job site. Should be coded as six digits with no slashes or dashes. Example: January 15, 1997 would be coded as 011597.
- (4) CONTRACT NO: The contract should be coded in the format ABBBB-C. All contracts will start with an “A” for Aeronautics. “BBBB” is the last four digits of the Illinois project number and “C” equals 1 for the first contract, 2 for the second contract and so on. For example, the materials contract number for Illinois Project No. 92A-44-1496, Contract #4, is “A1496-4”.
- (5) MATERIAL CODE: Material code is obtained from the MISTIC code book.
- (6) QUANTITY: The quantity of the material inspected, in the units specified in the MISTIC code book.
- (7) UNIT: The units specified under the material code in the MISTIC code book. The units must exactly match those in the MISTIC code book even if they are grammatically incorrect. NOTE: These units will not always match the pay item units.
- (8) INSPECTION DATA: Enter either “CRT” for manufacturer’s certification or “VIS” for visual. Most of the time “CRT” should be used. See Section 100.20 for an explanation of these terms.
- (9) DATE ASSIGNED: Normally the date that the form is filled out. Use the same format as the DATE SAMPLED FIELD.

- (10) AIRPORT: The airport name
- (11) ILLINOIS PROJECT: The Illinois Project number.
- (12) AIP PROJECT: The Airport Improvement Project (AIP) number.
- (13) REMARKS: Put the Pay Item Code number in the remarks as well as any other pertinent information about the materials.
- (14) INSPECTED BY: Signature of person filling out the M-5.

ADDITIONAL FIELDS THAT MAY BE REQUIRED

- (A) FIELD NUMBER: An optional field for the Resident Engineer's accounting purposes
- (B) DESC. 1: An additional field sometimes required by MISTIC (see code book) usually corresponding to a dimension or physical property of the material.
- (C) DESC. 2: An additional descriptive field sometimes required by MISTIC (see code book).
- (D) DESC. 3: An additional descriptive field sometimes required by MISTIC (see code book).
- (E) #PCS: Number of pieces: Normally used for materials such as reinforced concrete pipe.

**ATTACHMENT 1**  
Typical Material Codes and Units  
(For use on Form AER M-5)

**ILLINOIS DIVISION OF AERONAUTICS**  
**Common Material Codes for Each Pay Item**

Specification

Pay Item

Material Code

Unit

**ITEM 155 LIME TREATED SUBGRADE**

155-8.10	LIME-TREATED SUBGRADE	SQYD
003FA00	Lime, Hydrated	TONS
003FA01	Lime, By-Product Code L	TONS
004MF03	Dust, Kiln	TONS

**ITEM 201 BITUMINOUS BASE COURSE**

201-6.10	BITUMINOUS BASE COURSE	TONS
18612	Bit. Base Cr., Ty. B, Aero	TONS
18622	Bit. Base Rec., Ty B, Aero	TONS

**ITEM 208 AGGREGATE BASE COURSE**

208-5.10	AGGREGATE BASE COURSE	TONS
040CA06	Gravel, Class C Quality	TONS
040CA10	Gravel, Class C Quality	TONS
041CA06	Gravel, Crushed Class C Quality	TONS
041CA10	Gravel, Crushed Class C Quality	TONS
042CA06	Stone, Crushed Class C Quality	TONS
042CA10	Stone, Crushed Class C Quality	TONS
050CA06	Gravel, Class D Quality	TONS
050CA10	Gravel, Class D Quality	TONS
051CA06	Gravel, Crushed Class D Quality	TONS
051CA10	Gravel, Crushed Class D Quality	TONS
052CA06	Stone, Crushed Class D Quality	TONS
052CA10	Stone, Crushed Class D Quality	TONS

**ITEM 209 CRUSHED AGGREGATE BASE COURSE**

209-5.10	CRUSHED AGGREGATE BASE	TONS
041CA06	Gravel, Crushed Class C Quality	TONS
041CA10	Gravel, Crushed Class C Quality	TONS
042CA06	Stone, Crushed Class C Quality	TONS
042CA10	Stone, Crushed Class C Quality	TONS
051CA06	Gravel, Crushed Class D Quality	TONS
051CA10	Gravel, Crushed Class D Quality	TONS
052CA06	Stone, Crushed Class D Quality	TONS
052CA10	Stone, Crushed Class D Quality	TONS

**ITEM 401 BITUMINOUS SURFACE COURSE**

401-6.10	BITUMINOUS SURFACE COURSE	TONS
18712	Bit. Surface Cr., Ty. B	TONS

**ITEM 402 POROUS FRICTION COURSE**

402-6.10	POROUS FRICTION COURSE	SQYD
18304	Por. Fr. Cr., 1/2 Max, Aero	TONS

ITEM 501 PC CONCRETE PAVEMENT (Plain & Reinforced)

501-5.10	PC CONCRETE PAVEMENT	SQYD
21601	Concrete, Portland Cement	CUYD
022CA07	Stone, Crushed, Class A Quality	TONS
022CA11	Stone, Crushed, Class A Quality	TONS
027FA01	Sand, Natural Fine Aggregate, Class A	TONS
027FA02	Sand, Natural Fine Aggregate, Class A	TONS
37601	Portland Cement, Type I	CWT
62702	Dowel Bar, Joint Assembly Contraction	PC
6280301	Fabric, Welded Wire, AASHTO M-55, Smooth	SQYD
6280302	Fabric Pavement, Welded Wire, AASHTO M-55, Smooth	SQYD
6290140	Bar, Deform Billet, AASHTO M-31 40	LB
6290160	Bar, Deform Billet, AASHTO M-31 60	LB
43---	Membrane Curing Compound, Type--, (Manufacturer)	GAL

ITEM 602 BITUMINOUS PRIME COAT

602-5.10	BITUMINOUS PRIME COAT	GAL
10501	Asphalt, Liquid Med. Curing Grade MC-30	GAL
10502	Asphalt, Liquid Med. Curing Grade MC-70	GAL

ITEM 603 BITUMINOUS TACK COAT

603-5.10	BITUMINOUS TACK COAT	GAL
10401	Asphalt, Liquid Rapid Curing Grade RC-70	GAL
10705	Asphalt, Anionic Emulsified, Slow Setting Grade SS-1	GAL
10905	Asphalt, Cationic Emulsified, Grade CSS-1	GAL

ITEM 605 JOINT SEALING FILLER

605-5.10	JOINT SEALING FILLER	LINFT
61608	Joint Filler, Preformed Polychloroprene (Rod Stock)	LINFT
61907	Joint Sealer, Hot-Poured	LB
61908	Joint Sealer, 2-Compound Cold Poured	LB
605-5.20	PREFORMED ELASTIC SEALER	LINFT
61904	Joint Sealer, Preformed Compression, Pavement	LINFT

ITEM 610 STRUCTURAL PC CONCRETE

610-5.10	STRUCTURAL PC CONCRETE	CUYD
21601	Concrete, Portland Cement	CUYD
022CA07	Stone, Crushed, Class A Quality	TONS
022CA11	Stone, Crushed, Class A Quality	TONS
027FA01	Sand, Natural Fine Aggregate, Class A	TONS
027FA02	Sand, Natural Fine Aggregate, Class A	TONS
37601	Portland Cement, Type I	CWT
610-5.20	STEEL REINFORCEMENT	LB
6280301	Fabric, Welded Wire, AASHTO M-55, Smooth	SQYD
6280302	Fabric Pavement, Welded Wire, AASHTO M-55, Smooth	SQYD
6290140	Bar, Deform Billet, AASHTO M-31 40	LB
6290160	Bar, Deform Billet, AASHTO M-31 60	LB

## ITEM 620 PAVEMENT MARKING

620-5.10	PAVEMENT MARKING	SQFT
40444	Paint, Pavement Marking, Acrylic, Latex, White	GAL
40445	Paint, Pavement Marking, Acrylic, Latex, Yellow	GAL
40450	Paint, Pavement Marking, Acrylic, Latex, Black	GAL
60409	Bead, Glass (TTB 1325A, Type 3)	LB

## ITEM 625 TAR EMULSION PROTECTIVE SEAL COAT

625-5.10	TAR EMULSION SEAL COAT	SQYD
38204	Coal-Tar Pitch Emulsion (R-355)	GAL

## ITEM 161 WIRE FENCE WITH STEEL POSTS

161-5.10	FENCE, CLASS C	LINFT
57802	Fabric, Woven Wire Fence, Galvanized Steel	LINFT
57602	Wire, Barb, Galvanized Steel	LINFT
58201	Post, Terminal, Galvanized Woven Wire (Structural Shape)	EA
58207	Post, Line, Galvanized Woven Wire (Structural Shape)	EA
161-5.20	WALKWAY GATES	EA
58505	Gate, Woven Wire, Single	EA
58506	Gate, Woven Wire, Double	EA
161-5.30	DRIVEWAY GATES	EA
58505	Gate, Woven Wire, Single	EA
58506	Gate, Woven Wire, Double	EA

## ITEM 162 CHAIN-LINK FENCES

162-5.10	FENCE, CLASS E	LINFT
57701	Fabric, Chain Link Fence, Aluminum	LINFT
57702	Fabric, Chain Link Fence, Aluminum Coated Steel	LINFT
57703	Fabric, Chain Link Fence, Galvanized Steel	LINFT
57704	Fabric, Chain Link Fence, Vinyl Coated Galvanized Steel	LINFT
58004	Brace, Horizontal, Galvanized Chain Link (Pipe)	LINFT
58104	Post, Terminal, Chain Link (Pipe) Galvanized Steel	EA
58111	Post, Line	EA
162-5.20	DRIVEWAY GATES	EA
58501	Gate, Chain Link, Single	EA
58502	Gate, Chain Link, Double	EA
58503	Gate, Chain Link, Modified	EA
58504	Gate, Chain Link, Special	EA
162-5.30	WALKWAY GATES	EA
58501	Gate, Chain Link, Single	EA
58502	Gate, Chain Link, Double	EA
58503	Gate, Chain Link, Modified	EA
58504	Gate, Chain Link, Special	EA

ITEM 701 PIPE FOR STORM SEWERS AND CULVERTS

701-5.10	CONCRETE FOR PIPE CRADLES	CUYD
21601	Concrete, Portland Cement	CUYD

ITEM 705 PIPE UNDERDRAINS FOR AIRPORTS

705-5.10	POROUS BACKFILL NO. 1	CUYD
027FA02	Sand, Natural, Class A Quality	TONS

705-5.20	POROUS BACKFILL NO. 2	CUYD
050CM14	Gravel, Class D Quality	TONS
051CM14	Crushed Gravel, Class D Quality	TONS
052CM14	Crushed Stone, Class D Quality	TONS

705-5.30	(SIZE) INCH (TYPE OF PIPE)	LINFT
49300	Tubing, Drainage, Perforated, Corrugated Polyethylene	LINFT

ITEM 751 MANHOLES, CATCH BASINS, INLETS AND INSPECTION HOLES

751-5.10	INLETS	EA
20489	Frame and Grate Special	EA
751-5.20	MANHOLES	EA
26101	Manholes, Complete	EA
751-5.30	CATCH BASINS	EA
26102	Catch Basins, Complete	EA
751-5.40	INSPECTIONS HOLES	EA
20689	Frame and Lid, Special	EA

ITEM 752 CONCRETE CULVERTS, HEADWALLS AND MISCELLANEOUS DRAINAGE STRUCTURES

752.5.10	CONCRETE CULVERTS (Describe Special as Required)	EA
21601	Concrete, Portland Cement	CUYD
752-5.20	HEADWALL, TYPE	EA
21601	Concrete, Portland Cement	CUYD
25703	Headwall, Concrete	EA
752-5.60	CONCRETE PIPE END SECTION (dia.)	EA
21601	Concrete, Portland Cement	CUYD
25213	End Sections, Precast Rectangular	EA
25701	Flared End Section, Reinforced Concrete	EA

ITEM 754 CONCRETE GUTTERS, DITCHES AND FLUMES

754-5.10	CONCRETE GUTTER	LINFT
21601	Concrete, Portland Cement	CUYD
754-5.20	PAVED DITCHES	LINFT
21601	Concrete, Portland Cement	CUYD
754-5.30	CONCRETE FLUMES	LINFT
21601	Concrete, Portland Cement	CUYD

ITEM 901 SEEDING

901-5.10	SEEDING	AC
564--	Seed, (Type)	LB
5610-	Fertilizer (Nutrient Type)	LB
002FA00	Limestone, Agricultural	TONS

ITEM 904 SODDING

904-5.10	SODDING	SQYD
56302	Sod	SQYD

ITEM 908 MULCHING

908-5.10	MULCHING	SQYD
562--	Mulch (Type)	TONS

ITEM 101 INSTALLATION OF AIRPORT ROTATING BEACONS

101-5.10	AIRPORT ROTATING BEACON	EA
72000	Beacon, Airport Rotating	EA

ITEM 103 INSTALLATION OF AIRPORT BEACON TOWERS

103-5.10	BEACON TOWER, IN PLACE	EA
72001	Beacon Tower, In Place	EA

ITEM 107 INSTALLATION OF AIRPORT 8-FOOT & 12-FOOT WIND CONES

107-5.10	8 FOOT WIND CONE	EA
72010	Wind Cone, 8 Foot	EA
107-5.20	12 FOOT WIND CONE	EA
72011	Wind Cone, 12 Foot	EA

ITEM 108 INSTALLATION OF UNDERGROUND CABLE FOR AIRPORTS

108-5.10	UNDERGROUND CABLE	LINFT
30170	Cable Electrical Underground, 1/C L-824TYA	LINFT
30171	Cable Electrical Underground, 2/C L-824TYA	LINFT
30172	Cable Electrical Underground, 1/C L-824TYB	LINFT
30173	Cable Electrical Underground, 2/C L-824TYB	LINFT
30174	Cable Electrical Underground, 1/C L-824TYC	LINFT
30175	Cable Electrical Underground, 2/C L-824TYC	LINFT
108-5.30	BARE COUNTERPOISE WIRE	LINFT
30608	Wire, Bare Counterpoise	LINFT
108-5.40	CABLE IN UNIT DUCT	LINFT
30504	Unit Duct (Coilable Plastic), Complete NEMA TC-7 0.75	LINFT

ITEM 109 INSTALLATION OF AIRPORT TRANSFORMER VAULT AND VAULT EQUIPMENT

109-5.10	CONSTRUCT TRANSFORMER VAULT	EA
72020	Vault, Construct Transformer	EA

109-5.20	ERECT PREFABRICATED VAULT	EA
72021	Vault, Erect Prefabricated	EA
109-5.30	INSTALL VAULT EQUIPMENT	LSUM
72022	Regulator, Constant Current	EA

**ITEM 110 INSTALLATION OF AIRPORT UNDERGROUND ELECTRICAL DUCT**

110-5.10	2-WAY CONCRETE ENCASED DUCT	LINFT
21601	Concrete, Portland Cement	CUYD
31101	Conduit, Rigid Plastic, PVC, NEMA TC-2	LINFT
110-5.20	4-WAY CONCRETE ENCASED DUCT	LINFT
21601	Concrete, Portland Cement	CUYD
31101	Conduit, Rigid Plastic, PVC, NEMA TC-2	LINFT
110-5.30	6-WAY CONCRETE ENCASED DUCT	LINFT
21601	Concrete, Portland Cement	CUYD
31101	Conduit, Rigid Plastic, PVC, NEMA TC-2	LINFT
110-5.70	4" STEEL DUCT, DIRECT BURIAL	LINFT
31820	Duct, 4" Steel, Direct Burial	LINFT
110-5.80	4" STEEL DUCT, JACKED	LINFT
31821	Duct, 4" Steel, Jacked	LINFT

**ITEM 125 INSTALLATION OF AIRPORT LIGHTING SYSTEMS**

125-5.05	MIRL, STAKE MOUNTED	EA
33650	Light, MIRL Stake Mounted	EA
125-5.10	MIRL, BASE MOUNTED	EA
33651	Light, MIRL Base Mounted	EA
33663	Splice Cans, Electrical	EA
125-5.15	MITL, STAKE MOUNTED	EA
33652	Light, MITL Stake Mounted	EA
125-5.20	MITL, BASE MOUNTED	EA
33653	Light, MITL Base Mounted	EA
33663	Splice Cans, Electrical	EA
125-5.25	HIGH INTENSITY RUNWAY LIGHTS	EA
33661	Light, HITL Base Mounted	EA
125-5.30	M.I. THRESHOLD LIGHTS-STAKE MOUNTED	EA
33654	Light, MI Threshold Stake Mounted	EA
125-5.35	M.I. THRESHOLD LIGHTS BASE MOUNTED	EA
33655	Light, MI Threshold Base Mounted	EA
33663	Splice Cans, Electrical	EA
125-5.40	TAXI GUIDANCE SIGNS	EA

33663	Splice Cans, Electrical	EA
61332	Signing Components	EA
125-5.50	VASI-2	EA
33656	Light, VASI-2	EA
125-5.55	VASI-4	EA
33657	Light, VASI-4	EA
125-5.60	VASI-6	EA
33658	Light, VASI-6	EA
125-5.65	REILS	EA
33659	REILS	EA

## Assignment of Material Description

Airport \_\_\_\_\_ (10) Illinois Project: \_\_\_\_\_ (11) AIP Project: \_\_\_\_\_ (12)

From Producer No. \_\_\_\_\_ (1) Date: \_\_\_\_\_ (3)

Inspector No. \_\_\_\_\_ (2)

	Contract No.	Inspection Data	Material Code		Quantity Desc. 3	Unit #PCS	Field Number	
			Desc. 1	Desc. 2			Date Assigned	
1	(4)	(8)	(5)	(C)	(6)	(7)	(A)	
2			(B)		(D)	(E)	(9)	
3								
4								
5								

### Statement of Acceptance

The above material was visually inspected prior to and after incorporation into the work, and is accepted. This material is in substantial compliance with the governing standards, special provisions, plans and/ or applicable specifications for this contract. Copies of all required documentation and certification in the form of affidavits, test report, mill analysis delivery tickets, catalog cuts, etc. have been reviewed for conformance and are attached. Any irregularities or variances in acceptance procedures are explained on the attached sheet, documented below or on the back hereof.

Remarks: \_\_\_\_\_ (13)

Inspected by: \_\_\_\_\_ (14) Signature \_\_\_\_\_ AERM-5

**ATTACHMENT 2**  
**Stamps and Tags Used to Identify Approved or Sampled Materials**



H  
I<sup>D</sup><sub>18</sub>

This stamp indicates the product was approved at the source

This stamp indicates the piece of pipe has been tested to a .01 crack. The pipe is acceptable if stamp CERTIFIED or ILL OK

This stamp shows the product has been sampled. It does NOT indicate the product is approved

This stamp shows product was approved at the source. It is used to brand untreated native timber piling.

Contractor Smith, Inc.

Size and Type #15M Rebars Gr. 300

Quantity in this Shipment 1780 kg

Form LS8  
(49592-20M-10-85)

(OVER)

STATE OF ILLINOIS  
DEPARTMENT OF TRANSPORTATION

BUREAU OF MATERIALS AND PHYSICAL RESEARCH

This material has been inspected at the source of supply, found to comply with the requirements of the specifications, and is accepted.

Inspected by T. Jones Date 6/10/95

District 93

This tag is attached to products to indicate product was approved at source

## **ATTACHMENT 3**

### **Forms**

**(also see Aeronautic Web Page for individual forms)**

# Acceptance Testing for Density Bituminous Mixes

Airport:	Illinois Project:
Paving	
Start Date:	Federal Project:
Paving	
Finish Date:	Mix Design(s) Number:
Lot Quantity (tons):	Outlier:    Yes (    ) No (    )

## 1. Test Data

Lot-Sublot No.	Station	Rt.-Lt.	Air Voids
Mean ( $\bar{X}$ )		Standard Deviation (S)	

## 2. Quality Indexes

[ L = lower, U = upper ]

$$Q_L = (\bar{X} - 1)/S = \quad \quad \quad Q_U = (7 - \bar{X})/S = \quad \quad \quad$$

## 3. Percent Within Limits

[ L = lower, U = upper ]

$$PWL = [ PWT_L + PWT_U ] - 100 \quad \quad \quad PWL = ( \quad + \quad ) - 100$$

Note:  $PWT_L$  and  $PWT_U$  are obtained from table 8

$$PWL = ( \quad + \quad ) - 100$$

$$PWL = \quad$$

## 4. Pay Adjustment

(TABLE 7)

**PWL of Lot**

**% Adjustment**

90-100	100	} →	_____
80-89.9	0.5(PWL) + 55.0		
65-79.9	2.0(PWL) - 65.0		
Below 64.9	Note 1/ of Spec.		

## 5. Adjustment in Quantities (= % Adjustment x Lot Quantities)

$$\text{Adjustment in Quantities} = \quad \times \quad = \quad \text{Adjusted Tonnage}$$

Resident Engineer: \_\_\_\_\_  
 Contractor: \_\_\_\_\_

## Mean ( $\bar{X}$ ) and Standard Deviation Test for Outliers

Airport: Illinois Project:

Paving

Start Date: \_\_\_\_\_ A.I.P. Project: \_\_\_\_\_

---

Paving

Finish Date: \_\_\_\_\_ Mix Design(s) Number: \_\_\_\_\_

### 1. Calculation of Mean ( $\bar{X}$ ) and Standard Deviation (S)

Lot- Sublot No.	1 $X$	2 $X - \bar{X}$	3 $(X - \bar{X})^2$
TOTAL			

No. Sublots (N) =

$$\bar{X} = (\text{Total Column 1}) / N = \underline{\hspace{2cm}}$$
$$S = \sqrt{((\text{Total Column 3})/(N - 1))} =$$

## 2. Test for Outlier

Choose the  $X$  from column 1 that is the furthest from  $\bar{X} =$

$$T = | (X - \bar{X}) | / S = \underline{\hspace{2cm}}$$

Note : Difference between the suspect test value and the Mean ( $\bar{X}$ ).

Critical "T" Value for N =

**Outlier:**

Resident Engineer:

Consultant: \_\_\_\_\_

# Acceptance Testing for Strength 501 Concrete Mixes

Airport:	Illinois Project:
Pour	
Start Date:	Federal Project:
Pour	
Finish Date:	Mix Design(s) Number:
Lot Quantity:                      Sq. Yds.	Yes (                      )
Lot Quantity:                      Cu. Yds.	Outlier: No (                      )

## 1. Test Data

Lot-Sublot No.	Cubic Yard	28 Day Strength	
		Flexural	Compressive
<b>Mean ( <math>\bar{X}</math> )</b>		<b>Standard Deviation (S)</b>	

## 2. Quality Indexes

$Q_{(F)} = ( \bar{X} - 650\text{psi} ) / S =$	$Q_{(C)} = ( \bar{X} - 4000\text{psi} ) / S =$
---	--

## 3. Percent Within Limits (PWL)

PWL =	NOTE: PWL is obtained from Table 4.
-------	-------------------------------------

## 4. Pay Adjustment (Table in Special Provisions)

PWL	% Adjustment	
90-100	100	<div style="font-size: 3em;">}</div> <div style="font-size: 2em;">→</div>
80-89.9	.50(PWL) + 55.0	
65-79.9	2.0(PWL) - 65.0	
Below 64.9	Note 1/ of Spec.	

## 5. Adjustment in Quantities (= % Adjustment x Lot Quantities)Sq. Yds.

Adjustment in Quantities =	x		=	
				Adjusted Sq. Yds.

Resident Engineer: \_\_\_\_\_

Contractor: \_\_\_\_\_

# Concrete Plant Production Mix Verification

Airport:	Date:
Illinois Project:	A.I.P. Project:
Producer Name:	Producer Number:
Mix Design Number:	

	Mix Design	1	2
<b>Load/Ticket Number</b>			
<b>Batch Size (CYs)</b>	1CY		
CA-Weight (lb.)		(a)	(a)
CA - % Moisture (Please enter as a decimal)		(b)	(b)
FA - Weight (lb.)		(c)	(c)
FA - % Moisture (Please enter as a decimal)		(d)	(d)
Free Water (lb.)		(e)	(e)
Added Water (gal.)		(f)	(f)
Total Water (gal.)		(g)	(g)
Cementitious			
Cement (lbs.)			
Flyash (lbs.)			
Total Cementitious		(h)	(h)
Theo. W/C Ratio			
Actual W/C Ratio		(i)	(i)
AEA (oz.)			
WRDA (oz.)			

## Definitions

- a = Total Coarse Aggregate Batch Weight (lb.)  
 b = % Coarse Aggregate Moisture / 100 (Note: Use proper algebraic sign)  
 c = Total Fine Aggregate Batch Weight  
 d = % Fine Aggregate Moisture / 100 (Note: Use proper algebraic sign)  
 f = Metered or Weighed Batch Water (gal.)  
 h = Total Cement Batch Weight (lb.)

## Formulas

$$e = (a - a/(1+b)) + (c - c/(1+d))$$

$$g = e/8.33 + f$$

$$i = (g * 8.33)/h$$

Resident Engineer \_\_\_\_\_

## Assignment of Material Description

Airport: \_\_\_\_\_ Illinois Project: \_\_\_\_\_ A.I.P. Project: \_\_\_\_\_

From      Producer No.: \_\_\_\_\_ Date: \_\_\_\_\_

Inspector No.: \_\_\_\_\_

	Contract No.		Material Code		Quantity	Unit	Field Number
		Inspection Data	Desc. 1	Desc. 2	Desc. 3	#PCS	Date Assigned
1	A						
2	A						
3	A						
4	A						
5	A						

### Statement of Acceptance

The above material was visually inspected prior to and after incorporation into the work, and is accepted. This material is in substantial compliance with the governing standards, special provisions, plans and/ or applicable specifications for this contract. Copies of all required documentation and certification in the form of affidavits, test report, mill analysis delivery tickets, catalog cuts, etc. have been reviewed for conformance and are attached. Any irregularities or variances in acceptance procedures are explained on the attached sheet, documented below or on the back hereof.

Remarks: \_\_\_\_\_

\_\_\_\_\_

Inspected by:

Signature

AERM-5, Rev. 1/03

# Concrete Moisture Determination Adjusted Oven Dry Method

Date: \_\_\_\_\_

Airport: \_\_\_\_\_

Mix Design Number: \_\_\_\_\_

Location: \_\_\_\_\_

Consultant: \_\_\_\_\_

Ill. Project: \_\_\_\_\_

Contractor: \_\_\_\_\_

A.I.P. Proj.: \_\_\_\_\_

Producer: \_\_\_\_\_

	Time _____		Time _____	
	Fine Aggregate	Coarse Aggregate	Fine Aggregate	Coarse Aggregate
Sample Wt. + Pan Wt.	_____	_____	_____	_____
-Pan Wt.	_____	_____	_____	_____
= Sample Wt. (A)	_____	_____	_____	_____
Dried Sample Wt. + Pan Wt.	_____	_____	_____	_____
-Pan Wt.	_____	_____	_____	_____
= Dried Sample Wt. (B)	_____	_____	_____	_____
SSD Gravity (C)	_____	_____	_____	_____
OD Gravity (D)	_____	_____	_____	_____
(C)/(D)=(E)	_____	_____	_____	_____
SS Sample Wt. (B) x (E) = (F)	_____	_____	_____	_____
Sample Wt. (A)	_____	_____	_____	_____
- SS Sample Wt. (F)	_____	_____	_____	_____
= (G) (+/-)	_____	_____	_____	_____
% Moisture (SSD) (G)/(F)	_____	_____	_____	_____

Tested By \_\_\_\_\_

## Plastic Concrete Air, Slump and Quantity

Airport: \_\_\_\_\_

Consultant: \_\_\_\_\_

Illinois Project Number: \_\_\_\_\_

Prime Contractor: \_\_\_\_\_

A.I.P. Project Number: \_\_\_\_\_

Producer: \_\_\_\_\_

[illegible]

## P.C. Concrete Strength Report

Airport: \_\_\_\_\_

Consultant: \_\_\_\_\_

Mix Design Number: \_\_\_\_\_

Contractor: \_\_\_\_\_

III. Project Number: \_\_\_\_\_

Producer: \_\_\_\_\_

A.I.P. Project Number: \_\_\_\_\_

[illegible]

# Bituminous Mixture Daily Plant Output

Tons/Hr.	Batch Wt.	Batches	Loads	Tons	Mix No.	Date: _____
						Airport: _____
AC Prod.	Material	% Mix	Add Prod	Material	% AC	Illinois Project: _____
						A.I.P. Project: _____
Temp. (F)	Agg Drier	Agg Bin	Asphalt	Bit. Mix	Bit. Mix	
Max					(RE/RT)	Consultant: _____
Min						Contractor: _____
Wtd. Avg.						Producer: _____

Mix Time	Dry	Wet	Total	Plant Oper.	Start	Stop	Delays	Hrs
Contract		Job No.	Qty	Contract		Job No.	Qty.	

Remarks \_\_\_\_\_

Bin	RAP	Bin 5	Bin 4	Bin 3	Bin 2	Bin 1	M.F.	New Bit	Wash	Changed
Mix %										
Lb/Bt-Rev									Mix Form	Spec Range
Agg %								% Pass		
1.5	Wt %									
	% Bin									
1	Wt %									
	% Bin									
3/4	Wt %									
	% Bin									
1/2	Wt %									
	% Bin									
3/8	Wt %									
	% Bin									
4	Wt %									
	% Bin									
8	Wt %									
	% Bin									
16	Wt %									
	% Bin									
30	Wt %									
	% Bin									
50	Wt %									
	% Bin									
100	Wt %									
	% Bin									
200	Wt %									
	% Bin									
Bit.										
AC - Prod	Ac-Code	Ticket	Date	Qty	AC-Prod	AC-Code	Ticket	Date	Qty	

## Bituminous Core Density Testing

Airport: \_\_\_\_\_

Consultant: \_\_\_\_\_

Illinois Project: \_\_\_\_\_

Contractor: \_\_\_\_\_

A.I.P. Project Number: \_\_\_\_\_

Producer: \_\_\_\_\_

Date Tested: \_\_\_\_\_

Mix Design Number: \_\_\_\_\_

Lot/Sublot								
Core No.								
1. Air Dry Wt.								
2. Sat Surf Dry Wt.								
3. Sat Sub Wt.								
4. Volume (2-3)								
5. Prel % Den ((1/4)/10)100								
6. Oven Dry Wt. + Pan								
7. Pan Wt.								
8. Oven Dry Wt. (6-7)								
9. Bulk SpG(d) (8/4)								
10. Max SpG (D) **								
11. Final % Den (9/10)100								
12. Req'd % Den								
13. Wt.-Sq yd/1" Thick								

Lot/Sublot	Core No.	Date Laid	Station	Ref	Thick (inches)	G <sub>mb</sub>	G <sub>mm</sub>	% Den	Avg.%

\*\* When quantity permits,a running average of four (4) G<sub>mm</sub> values shall be used.

Tested by: \_\_\_\_\_

Company: \_\_\_\_\_

# Bituminous Mixtures Extraction

Date: \_\_\_\_\_

Airport: \_\_\_\_\_ Consultant: \_\_\_\_\_

Illinois Project: \_\_\_\_\_ Contractor: \_\_\_\_\_

A.I.P. Project Number \_\_\_\_\_ Producer: \_\_\_\_\_

Mix #: \_\_\_\_\_ Dry Time: \_\_\_\_\_ Lot: \_\_\_\_\_ Sublot: \_\_\_\_\_

Type: \_\_\_\_\_ Washed: \_\_\_\_\_

Sieve	Wt.	Accum. Wt.	% Passing	Mix Formula	Tolerance (+ / -)	Spec Range
1.5						
1						
3/4						
1/2						
3/8						
4						
8						
16						
30						
50						
100						
200						
Pan						
Bit						

Extraction Data	
Pan, New Filter & Sample	g _____
Pan & New Filter	g _____
Sample	g _____
Pan, Used Filter, Aggregate	g _____
Pan & New Filter	g _____
Aggregate	g _____
Pan & Used Filter	g _____
Pan & New Filter	g _____
Dust in Filter	g _____
Sample	g _____
Aggregate	g _____
Bitumen	g _____

New Bit:	Marshall Stab:	Blows:	Gyro:	Flow:	TSR:
Bulk SPGR:	Max SPGR:	%Voids:	Density(PCF):		

Remark \_\_\_\_\_

CC: \_\_\_\_\_

Tested by: \_\_\_\_\_

## Field Gradations / Concrete Batch Weight Calculations

Airport: \_\_\_\_\_ Mix Design Number: \_\_\_\_\_

Date: \_\_\_\_\_ Consultant: \_\_\_\_\_

Illinois Project: \_\_\_\_\_ Contractor: \_\_\_\_\_

A.I.P. Project: \_\_\_\_\_ Producer: \_\_\_\_\_

### Field Gradations

**Fine Aggregate** Time \_\_\_\_\_

**Source:** \_\_\_\_\_

(Please enter "FA1" or "FA2") Gradation \_\_\_\_\_

Dry Sample + Tare \_\_\_\_\_

Tare Wt. \_\_\_\_\_

Dry Sample Wt. \_\_\_\_\_

Sieve	Individual Weight Retained	Cumul. Percent Retained	Percent Passing	Spec
1"				
3/8"				
No.4				
No.8				
No.16				
No.30				
No.50				
No.100				
No.200				

**Fine Aggregate** Time \_\_\_\_\_

**Source:** \_\_\_\_\_

(Please enter "FA1" or "FA2") Gradation \_\_\_\_\_

Dry Sample + Tare \_\_\_\_\_

Tare Wt. \_\_\_\_\_

Dry Sample Wt. \_\_\_\_\_

Sieve	Individual Weight Retained	Cumul. Percent Retained	Percent Passing	Spec
1"				
3/8"				
No.4				
No.8				
No.16				
No.30				
No.50				
No.100				
No.200				

**Coarse Aggregate** Time \_\_\_\_\_

**Source:** \_\_\_\_\_

(Please enter "CA7" or "CA11") Gradation \_\_\_\_\_

Dry Sample + Tare \_\_\_\_\_

Tare Wt. \_\_\_\_\_

Dry Sample Wt. \_\_\_\_\_

Sieve	Individual Weight Retained	Cumul. Percent Retained	Percent Passing	Spec
2"				
1.75"				
1.5"				
1"				
3/4"				
5/8"				
1/2"				
3/8"				
No.4				
No.16				
No.100				
No.200				

**Coarse Aggregate** Time \_\_\_\_\_

**Source:** \_\_\_\_\_

(Please enter "CA7" or "CA11") Gradation \_\_\_\_\_

Dry Sample + Tare \_\_\_\_\_

Tare Wt. \_\_\_\_\_

Dry Sample Wt. \_\_\_\_\_

Sieve	Individual Weight Retained	Cumul. Percent Retained	Percent Passing	Spec
2"				
1.75"				
1.5"				
1"				
3/4"				
5/8"				
1/2"				
3/8"				
No.4				
No.16				
No.100				
No.200				

Tested by: \_\_\_\_\_

## Concrete Batch Weight Calculations

Date: \_\_\_\_\_

Time: \_\_\_\_\_

### Mix Design Parameters (One Cubic Yard)

Mix No. \_\_\_\_\_

(a) C.A. (lbs.) \_\_\_\_\_  
C.A. SpG (Saturated Surface Dry) \_\_\_\_\_

(b) F.A. (lbs.) \_\_\_\_\_  
F.A. SpG (Saturated Surface Dry) \_\_\_\_\_

(c) Cement (lbs) \_\_\_\_\_

(d) Flyash (lbs) \_\_\_\_\_  
Hun. Wt. Cem. (cwt) \_\_\_\_\_  
Water (Gal/cwt) \_\_\_\_\_  
Ang. (Gal/cwt) \_\_\_\_\_  
Total Water (Gal/cwt) \_\_\_\_\_

(e) Water (Gal/CY) \_\_\_\_\_

### Moisture Corrections

(f) C.A. % Free Moisture (Form M-6)\*\*\* \_\_\_\_\_

(g) C.A. Adjustment (lbs) (a) \* (f) \_\_\_\_\_

(h) F.A. % Free Moisture (Form M-6)\*\*\* \_\_\_\_\_

(i) F.A. Adjustment (lbs) (b) \* (h) \_\_\_\_\_

(j) Water Adjustment (lbs) (g) + (i) \_\_\_\_\_

(k) Water Adjustment (gal) (j) / 8.33 \_\_\_\_\_

(l) C.A. (lbs/CY) (a) + (g) \_\_\_\_\_

(m) F.A. (lbs/CY) (b) + (i) \_\_\_\_\_

(n) Adjusted Water (gal/CY) (e) - (k) \_\_\_\_\_

### Batch Weight

(p) Batch Size (CY) \_\_\_\_\_

C.A. (lbs) (l) \* (p) \_\_\_\_\_

F.A. (lbs) (m) \* (p) \_\_\_\_\_

Cement (lbs) (c) \* (p) \_\_\_\_\_

Flyash (lbs) (d) \* (p) \_\_\_\_\_

Water (gal) (n) \* (p) \_\_\_\_\_

A.E.A. (oz) \_\_\_\_\_

WRDA (oz) \_\_\_\_\_

Other \_\_\_\_\_

\*\*\* Expressed as Decimal

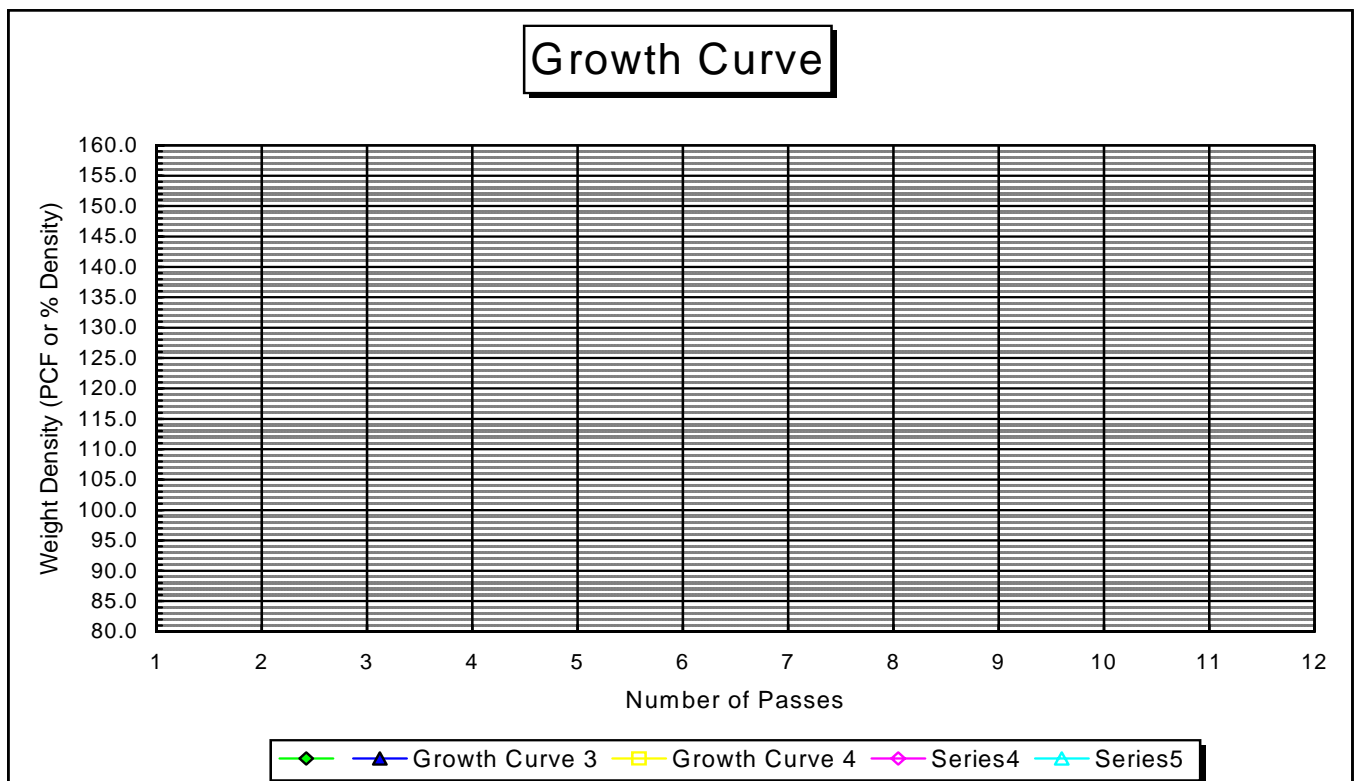
Calculated by: \_\_\_\_\_

## Test Strip Growth Curve

Airport:	Mix Design No.:	Date:
Location:	Roller Type:	Air Temp.:
IL Proj. No.:	Frequency:	G <sub>mm</sub> :
A.I.P. No.:	Mix Temp.:	Consultant:
Lift Thickness:	Contractor:	Ave. High PCF:
Producer:	Density:	Tested by:

Remarks:

No. of Passes	Count	PCF or %Density	Count	PCF or %Density	Count	PCF or %Density	Count	PCF or %Density
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								



## Bituminous Testing Summary

IL Project: \_\_\_\_\_

A.I.P. Project: \_\_\_\_\_

Airport: \_\_\_\_\_

Producer: \_\_\_\_\_

Mix Design No.: \_\_\_\_\_

Contractor: \_\_\_\_\_

Remarks: \_\_\_\_\_

Test Type: SP=Stockpile CF=Cold Feed CB=Combined Belt HB=Hot Bins IO=Ignition Oven EXT=Extraction QA=Quality Assurance Test

[illegible]

## PCC Testing Summary

Illinois Project: \_\_\_\_\_

A.I.P. Project \_\_\_\_\_

Airport: \_\_\_\_\_

Contractor: \_\_\_\_\_

Producer: \_\_\_\_\_

Remarks: \_\_\_\_\_

[illegible]

# Bituminous Nuclear Density Testing

Airport: \_\_\_\_\_ Lot Start Date: \_\_\_\_\_ Lot Finish Date: \_\_\_\_\_

Mix Design No.: \_\_\_\_\_ Consultant: \_\_\_\_\_

Illinois Project: \_\_\_\_\_ Contractor: \_\_\_\_\_

A.I.P. Project: \_\_\_\_\_ Producer: \_\_\_\_\_

Lot Number: \_\_\_\_\_ Lot Quantity (tons): \_\_\_\_\_

Random Test	Sub test	Station	Ref	Thick	G <sub>mb</sub>	G <sub>mm</sub>	% Density	Average Density	Results
Density #1 (Average of 5 "across mat" nuc. readings)	a								
	b								
	c								
	d								
	e								
Density #2 (Average of 5 "across mat" nuc. readings)	a								
	b								
	c								
	d								
	e								

Note: Requirement of two (2) Nuclear Density Tests (average of five readings across mat) per 500 ton of Bituminous mix for projects under 2,500 tons.

Test No.:	1a	1b	1c	1d	1e	2a	2b	2c	2d	2e
Date Laid										
1. Station										
2. Reference										
3. Thickness										
4. Density Count										
5. Moisture Count										
6. Wet Density (pcf)										
7. Moisture (pcf) (M)										
8. Moisture % (%M)										
9. Standard Maximum Density										
10. % Compaction										
Guage Number										
Daily Standard Count										

REMARKS: \_\_\_\_\_

\_\_\_\_\_

Inspector: \_\_\_\_\_

# Field Soil Compaction (Nuclear)

Airport: \_\_\_\_\_  
 Illinois Project: \_\_\_\_\_  
 A.I.P. Project: \_\_\_\_\_

Consultant: \_\_\_\_\_  
 Contractor: \_\_\_\_\_

	Test Date	Test No.	Station	Ref.	Type Const	Type Insp.	Original ID No.	Elevation Gnd	Grade	Test
A										
B										
C										
D										
E										
F										
G										

	Material Source	Soil Type	Test Method	Opt. H2O	Actual H2O	Standard Proctor	Actual Density	% Std.	Mn. Spec.	Results
A			NUC							
B			NUC							
C			NUC							
D			NUC							
E			NUC							
F			NUC							
G			NUC							

		A	B	C	D	E	F	G
1. Moisture Reading C.P.M.	A.							
	B.							
	C.							
	Avg.							
2. Moisture Standard Count								
3. Moisture Count Ratio (1 / 2)								
4. Density Depth								
5. Wet Density Reading C.P.M.								
	A.							
	B.							
	C.							
	Avg.							
6. Density Standard Count								
7. Density Count Ratio (5 / 6)								
8. Actual Wet Density #/Cu. Ft.								
9. Actual Moisture #/Cu. Ft.								
10. Actual Dry Dens. #/Cu.Ft. (8 - 9)								
11. Actual Moisture (9 / 10)x100								
12. Wt. Mold + Soil								
13. Wt. Mold								
14. Net Weight Soil (12-13)								
15. Wet Density #/Cu.Ft								
16. Dry Density #/Cu.Ft								
(Moisture Data)								
17. Initial Soil / P (Wet)								
18. Final Soil / P (Dry)								
19. Moisture Loss (17 - 18)								
20. Tare Weight								
21. Net Dry Soil (18 - 20)								
22. %Moisture (19 / 21)								

REMARKS: \_\_\_\_\_  
 \_\_\_\_\_

Inspector: \_\_\_\_\_  
 Res. Engineer: \_\_\_\_\_

# AGGREGATE MOISTURE DETERMINATION PYCNOMETER JAR METHOD

DATE: \_\_\_\_\_  
 PRODUCER: \_\_\_\_\_  
 PRODUCER NUMBER: \_\_\_\_\_  
 LOCATION: \_\_\_\_\_

AIRPORT: \_\_\_\_\_  
 IL PROJECT NO.: \_\_\_\_\_

	CA	FA
1.) <u>SPECIFIC GRAVITY OF AGGREGATE @ S.S.D.</u>	<input type="text"/>	<input type="text"/>
2.) <u>WEIGHT OF SAMPLE SIZE</u>	<input type="text"/>	<input type="text"/>
3.) <u>SAMPLE SIZE DIVIDED BY SPECIFIC GRAVITY (LINE 2/LINE 1)</u>	<input type="text"/>	<input type="text"/>
4.) <u>WEIGHT OF PYCNOMETER FULL OF WATER</u>	<input type="text"/>	<input type="text"/>
5.) <u>WEIGHT OF PYCNOMETER CONTAINING SAMPLE AND WATER</u>	<input type="text"/>	<input type="text"/>
6.) <u>WEIGHT OF WATER DISPLACED BY SAMPLE (LINE 2 + LINE 4 - LINE 5)</u>	<input type="text"/>	<input type="text"/>
7.) <u>WEIGHT DIFFERENCE (LINE 6 - LINE 3)</u>	<input type="text"/>	<input type="text"/>
8.) <u>SAMPLE SIZE MINUS WATER DISPLACEMENT (LINE 2 - LINE 6)</u>	<input type="text"/>	<input type="text"/>
9.) <u>MOISTURE (% +/-) (LINE 7/LINE 8 X 100)</u>	<input type="text"/>	<input type="text"/>

Coarse Aggregate: 2000 gram sample

Fine Aggregate: 1000 gram sample

$$P = [(V - (2000/\text{Sp. Gr.})) / (2000 - V)] \times 100$$

$$P = [(V - (1000/\text{Sp. Gr.})) / (1000 - V)] \times 100$$

Where: P= Free Moisture (%)  
 V= Weight of water displaced by sample (grams)  
 Sp. Gr. = Specific Gravity (SSD) (from mix design)

AER M-19, Rev. 1/03

## MIXER PERFORMANCE TESTS

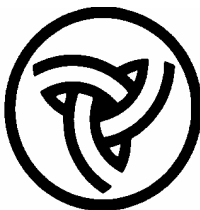
Date \_\_\_\_\_  
 Plant Name \_\_\_\_\_  
 Mixer Capacity \_\_\_\_\_  
 Mixer Make \_\_\_\_\_  
 Mix Design Used \_\_\_\_\_

Serial Number \_\_\_\_\_  
 Capacity Checked \_\_\_\_\_  
 Mixing Time Checked \_\_\_\_\_  
 Approved Mixing Time \_\_\_\_\_  
 Drum RPM \_\_\_\_\_

Airport \_\_\_\_\_  
 IL Project No. \_\_\_\_\_  
 A.I.P. Project No. \_\_\_\_\_  
 Contractor \_\_\_\_\_  
 Consultant \_\_\_\_\_

Batch No.	Test No.	Slump (in)	Avg. Slump (in)	Total Var. (in)	Air (%)	Avg. Air (%)	Total Var. (%)	Conc. Wt.	Plus #4 Wt.	Coarse Aggr. %	Total Var. (%)	Strength (psi)	Avg. psi	Total Avg.	% of Average	Total Var. from Average	Max. Var. from Avg.
1	1																
	2																
	3																
2	1																
	2																
	3																
3	1																
	2																
	3																
4	1																
	2																
	3																
5	1																
	2																
	3																

**ATTACHMENT 4**  
**Aggregate Certification of Compliance**



# Illinois Department of Transportation

Division of Aeronautics

1 Langhorne Bond Drive / Springfield, Illinois / 62707-8415

## AGGREGATE CERTIFICATION OF COMPLIANCE

**Airport:**

**Ill. Proj. No.:**

**AIP Proj. No.:**

**Contractor:**

**Construction Project Description:**

It is hereby certified that the aggregate from \_\_\_\_\_, producer/supplier number \_\_\_\_\_, was supplied for use in the construction of item \_\_\_\_\_, \_\_\_\_\_ on the referenced project. The gradation supplied from this source is \_\_\_\_\_. The aggregates conforming to this gradation meet or exceed the quality and freeze-thaw (if specified) requirements for a class \_\_\_\_\_ quality aggregate as defined in the Contract Specifications, Plans, or Special Provisions. The quantity of this aggregate that was supplied and used in construction of the pay item listed herein is \_\_\_\_\_ tons. A representative delivery ticket is attached hereto and there are delivery tickets accounting for the full quantity of aggregate delivered and used which have been supplied to the project Resident Engineer and are also filed and available upon request.

The undersigned representative of \_\_\_\_\_ certifies, to the best of his or her knowledge and belief, that:

This certification is a material representation of fact upon which reliance will be placed when payment is made on the subject contract to \_\_\_\_\_.

\_\_\_\_\_  
(Signature of Company Representative)

\* \* \*

This certification is being made under oath, subject to all pertinent civil remedies and criminal penalties including fraud, theft, and perjury.

Signed and sworn or affirmed before me,  
a notary public, this \_\_\_ day of \_\_\_\_\_, 20\_\_.

\_\_\_\_\_  
Notary Public

My commission expires:

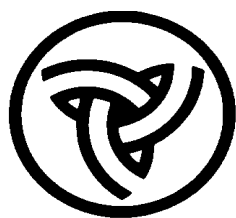


1 Langhorne Bond Drive / Springfield, Illinois / 62707-8415

## **INSTRUCTIONS FOR “AGGREGATE CERTIFICATION OF COMPLIANCE” FORM**

- Item #1: Insert Airport Name
- Item #2: Insert the Illinois Project Number of the Contract
- Item #3: Insert the AIP Project Number, if applicable, for the Contract
- Item #4: Insert the project Contractor Name
- Item #5: Insert the project description
- Item #6: Insert the name of the aggregate producer/supplier
- Item #7: Insert the aggregate producer/supplier number, as designated by the MISTIC coding system
- Item #8: Insert the pay item number, as listed in the contract (i.e. AR#####)
- Item #9: Insert the pay item name, as listed in the contract
- Item #10: Insert the gradation designation attributed to the aggregate being certified (i.e. CA-16, FA02, etc.)
- Item #11: Insert the quality designation attributed to the aggregate being certified (i.e. Class A, Class B, etc.)
- Item #12: Insert the tonnage supplied for this particular project, of the specified aggregate being certified
  
- Item #13: Same as #6
- Item #14: Same as #4
- Item #15: Signature of qualified Company Representative
- Item #16: Signature of qualified Notary Public

**ATTACHMENT 5**  
**Material Certification**



# Illinois Department of Transportation

Division of Aeronautics

## MATERIALS CERTIFICATION

Airport:  
Ill. Proj. No.:  
AIP Proj. No.:  
Contractor:  
Construction Project Description:

Pursuant to Federal Aviation Regulations, Part 152, as amended, and as a condition of federal financial assistance through a grant offer from the FAA for the above airport development project, it is hereby represented, to the best of our knowledge, information and belief that:

1. Materials testing was performed in conformance with American Society for Testing and Materials (ASTM) standards.
2. Materials inspection was performed by qualified personnel.
3. Unless otherwise noted, all materials (as provided and as incorporated) were found to be in conformance with the appropriate specifications and special provisions. If applicable, materials (as provided and/or as incorporated) found to be out of tolerance or incorporated without certification are listed and described on the attachment titled "Exceptions and Non-Certified Materials". Items under the heading "Materials Certified With Exceptions" include reasons for acceptance and/or pay reductions. This includes pay penalties applied under Quality Assurance specifications. Items under the heading "Non-Certified Materials" are considered not certifiable and/or not acceptable by the Illinois Division of Aeronautics.

This certification is hereby issued by the Division of Aeronautics based on documentation provided by the Engineer.

Date: \_\_\_\_\_

By: \_\_\_\_\_  
Material Certification Engineer  
Division of Aeronautics, IDOT

Date: \_\_\_\_\_

By: \_\_\_\_\_  
Engineer of Materials  
Division of Aeronautics, IDOT

It is hereby represented, to the best of our knowledge, information and belief, that the materials (as provided and as incorporated) used on the above project have been inspected, tested and documented in accordance with the Division of Aeronautics, Manual for Documentation of Airport Materials, February, 2004, Specifications for Construction of Airports, February 1, 2003, Special Provisions, and Policies of the Division. Based upon such inspection, tests and documentation (including material test results and certifications furnished by others), we believe to the best of our knowledge that all of the materials used substantially conform to these requirements except as noted on the "Exceptions and Non-Certified Materials" attachment.

Date: \_\_\_\_\_

By: \_\_\_\_\_  
Resident Engineer

Date: \_\_\_\_\_

By: \_\_\_\_\_  
Project Engineer

## EXCEPTIONS AND NON-CERTIFIED MATERIALS

Airport:  
Ill. Proj. No.:  
AIP Proj. No.:  
Construction Project Description:

<u>ITEM</u>	<u>MATERIALS CERTIFIED WITH EXCEPTIONS</u>
-------------	--

<u>ITEM</u>	<u>NON-CERTIFIED MATERIALS</u>
-------------	------------------------------------

**Project Material Approvals**

*Airport:*  
*Project Number:*  
*A.I.P. Project Number:*

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Date Approved:	Approved Substitutions:	Quantity Approved:	Units:	Credit?	Credit Amount:
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# **ATTACHMENT 6**

## **I.D.O.T. Approved List for Materials**

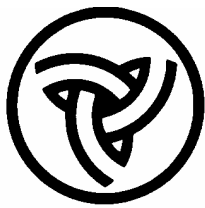
Web Page Address: [www.dot.state.il.us/materials/materialslist.html](http://www.dot.state.il.us/materials/materialslist.html)

## **I.D.A Materials Forms, Policies, and Mix Design Information**

Web Page Address: [www.dot.state.il.us/aero/aviamanual.html](http://www.dot.state.il.us/aero/aviamanual.html)

(These forms are “non-working” forms, for information or printing only: the formulas in the fields do not work like those on the disks distributed by the I.D.A. Materials Section)

**ATTACHMENT 7**  
**Certification of Fertilizer**



# Illinois Department of Transportation

Division of Aeronautics

1 Langhorne Bond Drive / Springfield, Illinois / 62707-8415

Subject: CERTIFICATION OF FERTILIZER

Airport:

Illinois Project:

A.I.P. Project:

We, \_\_\_\_\_ hereby certify that we furnished  
\_\_\_\_\_ lbs. of fertilizer for use on the above referenced project having a computed analysis  
of \_\_\_\_\_ % Nitrogen, \_\_\_\_\_ % Phosphorus, and \_\_\_\_\_ % Potash. Premixed bulk  
fertilizer was produced by mixing the following ingredients:

Weight	Analysis	Brand Name or Manufacturer
_____ lbs.	_____ lbs	_____
_____ lbs.	_____ lbs	_____
_____ lbs.	_____ lbs	_____

Total weight of Nitrogen Nutrients \_\_\_\_\_ lbs.

Total weight of Phosphorus Nutrients \_\_\_\_\_ lbs.

Total weight of Potash Nutrients \_\_\_\_\_ lbs.

Signed \_\_\_\_\_

Title \_\_\_\_\_

Company Address & Phone \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

Subscribed and sworn to before me this \_\_\_\_\_ day of \_\_\_\_\_, 200\_\_\_\_. My  
commission expires \_\_\_\_\_

\_\_\_\_\_  
Notary Public

## **ATTACHMENT 8**

### **Policies**

# **DIVISION OF AERONAUTICS**

## **POLICY MEMORANDUMS**

### I.D.O.T./BMPP Policy

Policy 04-03: Acceptance Procedure for Finely Divided Minerals Used in Portland Cement Concrete and Other Applications (1/15/04)

### Aeronautics Policies

Policy 87-2: Density Acceptance of Bituminous Pavements (1/1/99)

Policy 87-3: Mix Design, Test Batch, Quality Control, and Acceptance Testing of PCC Pavement Mixture (2/1/02)

Policy 87-4: Determination of Bulk Specific Gravity (d) of Compacted Bituminous Mixes (1/1/94)

Policy 90-1: Resampling and Retesting of PCC Pavement (1/1/01)

Policy 95-1: Field Test Procedures for Mixer Performance and Concrete Uniformity Tests (1/1/95)

Policy 96-1: Item 610, Structural Portland Cement Concrete: Job Mix Formula Approval & Production Testing (1/1/03)

Policy 96-2: Requirements for Laboratory, Testing, Quality Control, and Paving of Bituminous Concrete Mixtures (1/1/99) with Appendix A & B

Policy 96-3: Requirements for Quality Assurance on Projects with Bituminous Concrete Paving (1/1/97)

Policy 97-2: Pavement Marking Paint Acceptance (2/27/02)

Policy 2001-1: Requirements for Cold Weather Concreting (1/1/01)

Policy 2003-1: Requirements For Laboratory, Testing, Quality Control, and Paving of Superpave Bituminous Concrete Mixtures for Airports with Appendix A & B

State of Illinois  
Department of Transportation  
Bureau of Materials and Physical Research

POLICY MEMORANDUM

January 15, 2004	Springfield	04-03
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TO: DISTRICT ENGINEERS, HIGHWAY BUREAU CHIEFS, AND  
MANUFACTURERS AND SUPPLIERS OF FINELY DIVIDED MINERALS

SUBJECT: ACCEPTANCE PROCEDURE FOR FINELY DIVIDED MINERALS USED  
IN PORTLAND CEMENT CONCRETE AND OTHER APPLICATIONS

DEFINITIONS

**Department** - Illinois Department of Transportation.

**Bureau** - Bureau of Materials and Physical Research, at 126 East Ash Street, Springfield, Illinois 62704-4766.

**Finely Divided Mineral** - A finely divided material which has cementitious or pozzolanic properties. Examples are fly ash, microsilica (silica fume), ground granulated blast-furnace (GGBF) slag, and high-reactivity metakaolin (HRM).

**Manufacturer** - A company that manufactures a finely divided mineral. The term Producer is also used.

**Supplier** - A company that supplies a finely divided mineral which it does not manufacture.

**Source** - The name and location of the manufacturing process from which the finely divided mineral is obtained.

**Approved Source** - A source that is approved by the Bureau to ship a finely divided mineral for immediate use on Department projects.

**Unapproved Source** - A source that ships a finely divided mineral which must be sampled, tested, and approved by the Bureau before it is used on Department projects.

**Cement** - Portland cement.

**Fly Ash** - A finely divided residue that results from the combustion of ground or powdered coal, transported from the combustion chamber by exhaust gas, collected by mechanical or electrical means, and stored in stockpiles or bins.

**Microsilica** - An amorphous silica of high silica content and purity possessing high pozzolanic activity.

**Ground Granulated Blast-Furnace (GGBF) Slag** - A glassy granular material, formed when molten blast-furnace slag is rapidly chilled, and then finely ground.

**High-Reactivity Metakaolin (HRM)** - A reactive aluminosilicate pozzolan formed by calcining purified kaolinite at a specific temperature range.

**Reference Material** - A portland cement used for the control mortar and corresponding test mortars, of a finely divided mineral, to determine its strength activity index.

**Preliminary (PRE) Sample** - A sample used to determine, in advance, if the finely divided mineral will comply with Department specifications.

**Process Control (PRO) Sample** - A sample used for the purpose of controlling production of finely divided minerals proposed for incorporation into Department projects.

**Acceptance (ACC) Sample** - A sample used for accepting/rejecting finely divided minerals prior to its use on Department projects and/or unassigned stock for future use on projects. The quantity represented by acceptance samples must be given.

**Independent Assurance (IND) Sample** - A sample used to provide an independent check on the reliability of the manufacturer's quality control program.

**Investigation (INV) Sample** - A destination sample used to verify the acceptability of a finely divided mineral from a source.

**Grab Sample** - A sample secured from a conveyor, from bulk storage, or from a bulk shipment in one operation.

**Composite Sample** - Combined grab samples taken at prescribed intervals over a period of time.

**NIST** - National Institute of Standards and Technology.

**CCRL** - Cement and Concrete Reference Laboratory.

**ISO 9000 Series** - A program of international quality management system standards developed by the International Organization for Standardization (ISO).

## 1.0 PURPOSE

To establish procedures whereby materials of mineral origin, furnished by a **Manufacturer** or **Supplier**, will be accepted for use on **Department** projects.

## 2.0 SCOPE

This procedure is available to all **Manufacturers** or **Suppliers** of domestic and foreign **Finely Divided Minerals**. **Sources** in North America may be **Approved** or **Unapproved**. **Sources** located outside of North American will not be given **Approved Source** status, and the procedures in Sections 5.1 and 5.3 shall apply.

## 3.0 SPECIFICATION REQUIREMENTS, SAMPLING, AND TEST PROCEDURES

- 3.1 **Finely Divided Minerals** used on **Department** projects shall meet the material requirements of the **Department's** "Standard Specifications for Road and Bridge Construction", dated January 1, 1997, and current special provisions.
- 3.2 **Fly Ash** used on **Department** projects shall meet the standard physical and chemical requirements of AASHTO M 295, "Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Portland Cement Concrete," for Class C or Class F. A limitation of available alkalis, as  $\text{Na}_2\text{O}$ , of 1.5%, shall apply to fly ashes used in portland cement concrete mixtures and cement aggregate mixture II containing alkali-sensitive aggregates or admixtures.
- 3.3 **GGBF Slag** used on **Department** projects shall meet the standard physical and chemical requirements of AASHTO M 302, "Ground Iron Blast-Furnace Slag for Use in Concrete and Mortars," for a Grade 100 or a Grade 120 material.
- 3.4 **Microsilica** used on **Department** projects shall meet the standard physical and chemical requirements of AASHTO M 307, "Microsilica for Use in Concrete and Mortar," except that the Strength Activity Index requirement shall not apply. The **Microsilica** shall meet the "Accelerated pozzolanic activity index: With portland cement at 7 days," as specified by ASTM C 1240, "Standard Specification for Silica Fume for Use as a Mineral Admixture in Hydraulic-Cement Concrete, Mortar, and Grout." A limitation of available alkalis, as  $\text{Na}_2\text{O}$ , of 1.5% shall apply to **Microsilica** used in mixtures containing alkali-sensitive aggregates or admixtures.

- 3.5 **High-Reactivity Metakaolin (HRM)** used on Department projects shall meet the standard physical and chemical requirements of AASHTO M 295, "Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Portland Cement Concrete," for Mineral Admixture Class N, except that the Strength Activity Index requirement shall not apply. The HRM shall meet the "Accelerated pozzolanic activity index: With portland cement at 7 days," as specified by ASTM C 1240, "Standard Specification for Silica Fume for Use as a Mineral Admixture in Hydraulic Cement Concrete, Mortar, and Grout." A limitation of available alkalis, as Na<sub>2</sub>O, of 1.5%, shall apply to HRM used in mixtures containing alkali-sensitive aggregates or admixtures.

#### 4.0 APPROVED SOURCE PROCEDURE

- 4.1 A **Manufacturer** or **Supplier** requesting **Source** approval of a **Finely Divided Mineral** shall provide the following to the **Bureau**:

- (1) The **Manufacturer's** or **Supplier's** name and location.
- (2) The **Source** name, location (station), and number of generating units.
- (3) The name of the **Finely Divided Mineral** and its class or grade.
- (4) A certification that the **Finely Divided Mineral** meets the applicable requirements of Section 3.0.
- (5) A 6-month testing history.
- (6) A copy of the **Manufacturer's** or **Supplier's** quality control program.
- (7) A copy of the last CCRL inspection report of the testing laboratory used by the **Manufacturer** or **Supplier** of the **Finely Divided Mineral**, with documentation of resolution of any discrepancies noted therein. The **Manufacturer** or **Supplier** of HRM or Microsilica shall provide a copy of the testing laboratory's CCRL inspection report and/or an ISO 9000 Series certificate.
- (8) A copy of the Material Safety Data Sheet (MSDS) for the **Finely Divided Mineral**.

At the time of application, the **Manufacturer** or **Supplier** shall obtain a **Preliminary (PRE) Grab Sample** of the **Finely Divided Mineral** from current production. The **Manufacturer** or **Supplier** shall split the **PRE Sample** and place one portion in an airtight container and deliver it to the **Bureau**. A sample of the **Reference Material** used by the **Manufacturer** or **Supplier** for testing shall be included. The **Manufacturer** or **Supplier** shall assume the cost to deliver the samples to the **Bureau**. The size of the **Bureau's** portion of the **PRE Sample**, and the **Reference Material**, shall not be less than 3 kg (6 lb.) each and the samples shall be properly identified as required in Attachment 1. The **Manufacturer** or **Supplier** shall test the retained portion of the **PRE Sample** for

the standard physical and chemical properties listed in the applicable specification in Section 3.0 and deliver a copy of the test results to the **Bureau** for comparison.

The **Bureau** will test its portion of the **PRE Grab Sample** for conformance to Section 3.0. The **Bureau** will compare the results obtained by both laboratories to determine compliance with the allowable difference between two laboratories set forth in the precision statement of each test method. Additional split sample testing will be required if the test results obtained on the **PRE Grab Sample** do not comply with the specification requirements of this policy memorandum.

An inspector from the **Bureau** may conduct a scheduled visit to inspect the laboratory facilities designated by the **Manufacturer** or **Supplier** to test the **Finely Divided Mineral**; the **Source** manufacturing process, the **Source** storage facilities; and the quality control policies, procedures, and practices used by the **Manufacturer** or **Supplier**. The **Manufacturer** or **Supplier** shall be responsible for payment of transportation, per diem (meals), lodging, and incidental travel costs incurred by the **Department**.

The **Bureau** will notify the **Manufacturer** or **Supplier**, in writing, if the request for **Approved Source** status is granted or denied. A request may be denied if the **Manufacturer** or **Supplier** fails to meet the requirements of this policy memorandum, or for other reasons determined by the **Department**.

#### 4.2 Quality Control Requirements For **Approved Sources**:

The **Manufacturer** or **Supplier** shall establish and maintain quality control policies and procedures for sampling and testing that are approved by the **Bureau**. The **Bureau** shall be notified of any changes in the **Manufacturer's** or **Supplier's** quality control program.

Testing laboratories used by the **Manufacturers** or **Suppliers** of **Fly Ash** or **GGBF Slag** shall participate in the CCRL pozzolan program of the **NIST**, which includes inspection of facilities and testing of comparative samples. Testing laboratories used by the **Manufacturers** or **Suppliers** of **Microsilica** or **HRM** shall participate in the CCRL pozzolan program of the **NIST** and/or shall have implemented a quality management system based on the **ISO 9000 Series** standards.

#### 4.3 Reporting Requirements For **Approved Sources**:

The **Manufacturer** or **Supplier** shall deliver a test report to the **Bureau** each month listing the results of all **Grab** and **Composite Samples** taken and tested for the month. Sampling, testing, and reporting shall be done according to the applicable specification in Section 3.0.

#### 4.4 Record Requirements For **Approved Sources**:

Records of production control tests shall be maintained by the **Manufacturer** or **Supplier** for a minimum period of 5 years, and shall be made available to the **Bureau** upon request.

Copies of bills of lading of quantities of **Finely Divided Minerals** shipped shall be maintained by the **Manufacturer** or **Supplier** for a minimum period of 3 years, and shall be made available to the **Bureau** upon request.

#### 4.5 Sampling and Test Requirements for **Approved Sources**:

Each January, April, July, and October (unless otherwise specified by the **Bureau**) the **Manufacturer** or **Supplier** shall obtain a **Process Control (PRO) Grab Sample** of the **Finely Divided Mineral**, which shall be split for testing by the **Manufacturer** or **Supplier** and the **Bureau**. At this time, a sample of the current **Reference Material** used by the **Manufacturer** or **Supplier** for testing shall also be split. The **Bureau** samples shall be placed in airtight containers, properly identified as required in Attachment 2, and immediately delivered to the **Bureau**. Each **Finely Divided Mineral** sample and **Reference Material** sample shall not be less than 3 kg (6 lb).

The **Manufacturer** or **Supplier** shall test the retained portion of each **PRO Sample**, using the retained portion of the **Reference Material**, for the standard physical and chemical properties listed in the applicable specification in Section 3.0. When all tests are completed, the **Manufacturer** or **Supplier** shall record the test results on a report form that identifies the sample as a **PRO Sample**, and promptly deliver the report to the **Bureau**.

The test results obtained by the **Manufacturer** or **Supplier** and the **Bureau** on all split samples will be compared for compliance with the allowable differences for two laboratories set forth in the precision statement of each test method and for compliance with Section 3.0. If significant differences exist in the split sample test results, the **Department** will investigate sampling and test procedures, or require additional comparative sampling to determine the cause of the variation.

#### 4.6 Department Inspections of **Approved Sources**:

An inspector from the **Bureau** may conduct unscheduled visits, at **Department** expense, to each **Approved Source** or one of its terminals. During this visit, the inspector will either take or witness the taking of a random **Independent Assurance (IND) Grab Sample**. The inspector will split the sample and deliver an equal portion to the **Manufacturer** or **Supplier**. The **Manufacturer** or **Supplier** shall test the retained portion of the split sample for the standard physical and chemical properties listed in the applicable specification and deliver the test results to the **Bureau**, as specified in Section 4.5, for comparison and compliance with Section 3.0.

Random Investigation (INV) Samples of the Finely Divided Minerals and the project Cement will be obtained at final destination by a representative of the Department. The representative will either take or witness the taking of the INV Samples. INV Samples will be Grab Samples and shall not be less than 3 kg (6 lb). (Note: Cement samples will be taken according to ASTM C 183). The sampling location and frequency for obtaining INV Samples will be determined by the Bureau in consultation with the district offices.

The Bureau will test INV Samples to ascertain the results of Finely Divided Mineral-project Cement combinations. To verify that Finely Divided Minerals shipped from Approved Sources meet the requirements of Section 3.0, the Bureau will test INV Samples with the appropriate Reference Material.

#### 4.7 Revocation of Approved Source Status:

Failure of a Manufacturer or Supplier to meet the requirements of Sections 3.0 and 4.0 of this policy memorandum will be sufficient cause to revoke Approved Source status.

Failure to resolve significant differences in testing, as indicated by the test results obtained on PRO or IND Samples split with the Manufacturer or Supplier will be sufficient cause to revoke Approved Source status.

Failure of the testing laboratory, used by the Manufacturer or Supplier of a Finely Divided Material, to satisfactorily resolve the discrepancies noted in the CCRL inspection report and/or to maintain a quality management system based on the ISO 9000 Series will be sufficient cause to revoke Approved Source status.

Revocation of Approved Source status will be reported to the Manufacturer or Supplier in writing. The Manufacturer or Supplier may not re-apply for Approved Source status until 30 days have elapsed from the date of the written notice of revocation.

### 5.0 UNAPPROVED SOURCE PROCEDURE

#### 5.1 A Manufacturer or Supplier requesting approval of a Finely Divided Mineral from an Unapproved Source shall provide the following to the Bureau:

- (1) The Manufacturer's or Supplier's name and location.
- (2) The Source name, location (station), and number of generating units.
- (3) The name of the Finely Divided Mineral and its class or grade.

- (4) A current test report, in English, which indicates the standard physical and chemical composition of the **Finely Divided Mineral** as per Section 3.0.
- (5) The transportation method and location at which an inspector from the **Bureau** will be able to obtain **Acceptance (ACC) Samples**.
- (6) If requested by the **Bureau**, the **Manufacturer** or **Supplier** shall deliver to the **Bureau** a 24-hr **Composite Preliminary (PRE) Sample** of the **Finely Divided Mineral** from current shipments. The **Manufacturer** or **Supplier** shall assume the cost to deliver it to the **Bureau**. The size of the **PRE Sample** shall not be less than 3 kg (6 lb) and the sample shall be properly identified as required in Attachment 1.

## 5.2 Sampling and Test Requirements for **Unapproved Sources** in North America:

- (1) **Finely Divided Minerals** from an **Unapproved Source** will be sampled, tested, and approved by the **Bureau** before use on **Department** projects. The **Bureau** has the option to affix a seal to secure **Finely Divided Minerals** in storage (e.g. silo, truck, railroad car, or barge) until the **Bureau's** testing is completed.
- (2) Upon arrival of the **Finely Divided Mineral** to Illinois, an inspector from the **Bureau** will obtain **Acceptance (ACC) Grab Samples** according to the applicable specifications. The **Bureau** will determine the number of representative samples required.
- (3) The **Manufacturer** or **Supplier** may request the **Bureau** to sample the **Finely Divided Mineral** prior to arrival in Illinois. In the event the request is approved, the **Manufacturer** or **Supplier** shall be responsible for payment of transportation, per diem (meals), lodging, and incidental travel costs incurred by the **Department** inspector. If the **Department** determines that it lacks the resources to accomplish out-of-state inspection, the **Finely Divided Mineral** may be sampled and tested according to the procedures in Section 5.3.
- (4) **Acceptance (ACC) Samples** will be tested by the **Bureau** for conformance to Section 3.0, and to approve the **Finely Divided Mineral** for use on **Department** projects.
- (5) **Random Investigation (INV) Samples** of **Finely Divided Minerals** may be obtained at final destination by a representative of the **Department**. The representative will either take or witness the taking of the **INV Samples**. **INV Samples** will be **Grab Samples** and will be taken according to the applicable specification. The sampling location and frequency for obtaining **INV Samples** will be determined by the **Bureau** in consultation with the district offices. The **Bureau** will use **INV Samples** to verify that the **Finely Divided Mineral** shipped meets the requirements of Section 3.0.

### 5.3 Sampling and Test Requirements for **Unapproved Sources** Located Outside North America:

An agent of the importer shall obtain an **Independent Assurance (IND) Grab Sample** from each barge of foreign **Finely Divided Mineral** loaded at the port of entry and destined for Illinois.

The agent shall split each barge **Grab Sample** and mail one portion to the **Bureau**. The other portion shall be mailed to the importer's testing laboratory that is approved by the **Department**. The importer of the **Finely Divided Mineral** shall be responsible for all sampling and mailing costs.

The importer's laboratory shall test its portion of each barge **Grab Sample** for the standard physical requirements of the applicable specifications. One random barge **Grab Sample**, representing the **Finely Divided Mineral** in each hold of the vessel shall be tested for chemical composition.

Upon completion of the tests, the importer shall deliver to the **Bureau** a certification that states the **Finely Divided Mineral** in the vessel unloaded at the port of entry has been tested by the importer, and complies with the applicable specifications. Attached to the certification shall be a test report of all barge samples. The report shall include the name of the vessel, the source of the **Finely Divided Mineral**, the barge number, the hold number, the date the sample was taken, the quantity of **Finely Divided Mineral** in the barge, and the physical and chemical test results obtained on the samples.

The importer shall immediately notify the **Bureau** if a barge sample fails to meet the applicable specification requirements.

The **Bureau** will review the certification and compare the importer's test data to the test data obtained by the **Bureau** on its portion of each split sample.

When the certification and the accompanying test report are examined and determined to be correct, the **Bureau** will notify the importer and the district offices that the **Finely Divided Mineral** is approved for state projects.

**Random Investigation (INV) Samples**, from one or more barges, may be taken by a **Department** inspector when the barges arrive at the Illinois terminal(s).

The **Department** will reject any foreign **Finely Divided Mineral** tested by the **Bureau**, or the importer, that does not meet the specification requirements. The **Department** may reject any barge of **Finely Divided Mineral** wherein the differences in test values, obtained by the **Department** and the importer on the split sample, exceeds the multilaboratory precision of the test method, but the **Finely Divided Mineral** is within specifications.

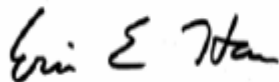
Alternative proposals to the sampling and test requirements stated in this section will be considered for **Finely Divided Minerals** which have an acceptable quality history, and which have previously been approved by the **Department**. Requests shall be directed to the **Bureau of Materials and Physical Research** for approval.

## 6.0 ACCEPTANCE OF FINELY DIVIDED MINERALS

- 6.1 **Finely Divided Minerals** will be accepted according to the **Department's** current "Standard Specifications for Road and Bridge Construction," current special provisions, and this policy memorandum.
- 6.2 The **Bureau** will maintain and circulate a current list of **Approved Sources of Finely Divided Minerals** which meet the requirements of this policy memorandum. This list will include the name, location, and Producer/Supplier Number of each approved **Manufacturer or Supplier of Finely Divided Minerals**. These **Manufacturers or Suppliers** may ship **Finely Divided Minerals** for immediate use on **Department** projects.
- 6.3 **Finely Divided Minerals** from **Unapproved Sources** will be approved by the **Bureau** before use on **Department** projects.

## 7.0 REJECTION OF FINELY DIVIDED MINERALS

- 7.1 A **Finely Divided Mineral** that fails to conform to the requirements of Section 3.0 of this policy memorandum shall be rejected for use on **Department** projects.
- 7.2 The **Bureau** will notify the **Manufacturer or Supplier** when a **Finely Divided Mineral** is rejected for use on **Department** projects.



Eric E. Harm, P.E.  
Engineer of Materials  
and Physical Research

Attachments

This policy memorandum supersedes Policy Memorandum 99-5 dated April 1, 1999.
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DAD/dsg

**PRE SAMPLE IDENTIFICATION**

MEMO TO: Illinois Department of Transportation  
Bureau of Materials and Physical Research

SUBJECT: Preliminary (PRE) Sample

DATE: \_\_\_\_\_

The enclosed Preliminary (PRE) Sample is submitted to the Bureau of Materials and Physical Research for testing:

**This PRE Sample is identified as follows:**

1. Manufacturer/Supplier Name: \_\_\_\_\_
2. Material Name (i.e. Fly Ash, GGBF Slag, etc.): \_\_\_\_\_
3. Material Class or Grade: \_\_\_\_\_
4. Name and Location of Source of Material: \_\_\_\_\_  
\_\_\_\_\_
5. Date Sample Was Taken: \_\_\_\_\_
6. Identification Number (If Used): \_\_\_\_\_
7. Sample Taken From (i.e. Truck, Silo, etc.): \_\_\_\_\_
8. Remarks: \_\_\_\_\_

**Instructions:** Include this sample identification sheet with each PRE Sample and mail to:

Illinois Department of Transportation  
Bureau of Materials and Physical Research  
126 East Ash Street  
Springfield, Illinois 62704-4766  
ATTN: J. R. Oglesby, Cement Technology Engineer

**PRO SAMPLE IDENTIFICATION**

MEMO TO: Illinois Department of Transportation  
Bureau of Materials and Physical Research

SUBJECT: Process Control (PRO) Sample

DATE: \_\_\_\_\_

The enclosed Process Control (PRO) Sample is submitted to the Bureau of Materials and Physical Research for testing:

**This PRO Sample is identified as follows:**

1. Manufacturer/Supplier Name: \_\_\_\_\_
2. Material Name (i.e. Fly Ash, GGBF Slag, etc.): \_\_\_\_\_
3. Material Class or Grade: \_\_\_\_\_
4. Name and Location of Source of Material: \_\_\_\_\_  
\_\_\_\_\_
5. Date Sample Was Taken: \_\_\_\_\_
6. Identification Number (If Used): \_\_\_\_\_
7. Sample Taken From (i.e. Truck, Silo, etc.): \_\_\_\_\_
8. Remarks: \_\_\_\_\_

**Instructions:** Include this sample identification sheet with each PRO Sample and mail to:

Illinois Department of Transportation  
Bureau of Materials and Physical Research  
126 East Ash Street  
Springfield, Illinois 62704-4766  
ATTN: J. R. Oglesby, Cement Technology Engineer

State of Illinois  
Department of Transportation  
Division of Aeronautics

POLICY MEMORANDUM

January 1, 2004

Springfield

Number: 87-2

TO: CONSULTING ENGINEERS

SUBJECT: DENSITY ACCEPTANCE OF BITUMINOUS PAVEMENTS

1. Introduction

This Policy Memorandum deals with the implementation of the Bituminous Density Quality Assurance specifications as a revision to the Standard Specification for Construction of Airports, January 1985. These revisions are to Item 201 Bituminous Base Course, and Item 401 Bituminous Surface Course.

II. Sampling

After completion of compaction and the pavement has reached ambient temperature, the paved area shall be divided into Sublots of 500 tons per type of mix. One core sample (2 cores per sample) shall be taken from each Sublot. The longitudinal and transverse location for each sample shall be determined by use of a random number "Deck" provided by the Division. No core shall be taken closer than two (2) feet from the edge of the mat. A core extraction device as illustrated by the attachment is recommended. All cores are to be taken by the contractor under the supervision and remain in the possession of the engineer. It is imperative that the Engineer and the contractor realize that the cores are "Money" and that improper coring, extraction, shipping and/or testing can be costly.

One mix sample per 1000 tons of mix laid shall be taken for Extraction, Maximum Specific Gravity ( $G_{mm}$ ) and Air Void tests. The mix samples shall be sampled by the contractor and split in half.

The Resident Engineer shall randomly designate and send the split samples to an independent laboratory for testing. The laboratory will be designated by the Division of Aeronautics. The frequency of testing split samples shall be 1 per 5000 tons. Higher frequencies may be necessary if the contractor's tests, and/or mix quality control are inconsistent.

### III. Testing

All cores shall be tested for Bulk Specific Gravity ( $G_{sb}$ ) in accordance with ASTM D2726 using Procedure 9.1, "For Specimens That Contain Moisture". The Theoretical Maximum Gravity ( $G_{mm}$ ) shall be determined according to ASTM D2041, Procedure 7. From these tests the in-place air voids of the compacted pavement are calculated according to ASTM D3203 for "dense bituminous paving mixtures". Selection of the proper  $G_{mm}$  shall be based on a running average of four (4) tests per Lot.

Eg. Lot 1 - Use the average of the two (2) tests for Lot 1.

Lot 2 - Use the average of the four (4) tests from Lots 1 and 2.

Lot 3 - Use the average of the four (4) tests from Lots 2 and 3.

NOTE: When more than four (4) Sublots are used, still use a running average of four (4) tests per Lot.

### IV. Acceptance Calculations

The first step in calculating the quantities for pay is to calculate the Mean ( $\bar{x}$ ) and the Standard Deviation (S) of the Sublot tests. From this data the Lot samples should first be tested for outliers. After consideration for outliers, the Percent Within Tolerance (PWT) and the Percent Within Limits (PWL) are calculated to determine the final pay quantities for the Lot.

#### EXAMPLE

##### 1. Test Data

Lot Quantity = 2000 tons  
Sublot Test 1 = 4.35 % Air  
Sublot Test 2 = 3.96 % Air  
Sublot Test 3 = 6.75 % Air  
Sublot Test 4 = 6.25 % Air

##### 2. Calculating the Mean and Standard Deviation

Sublot	$\underline{x}$	$(\underline{x} - \bar{x})$	$(\underline{x} - \bar{x})^2$
1	4.35	- 0.978	0.956
2	3.96	- 1.368	1.871
3	6.75	1.422	2.022
4	<u>6.25</u>	0.922	<u>0.850</u>
Sum =	21.31	5.699	

$$N = 4$$

$$\text{Mean}(\bar{x}) = 5.328$$

$$\text{Variance } (S)^2 = \frac{\text{Sum}(\underline{x} - \bar{x})^2}{3} = \frac{5.699}{3} = 1.900$$

$$\text{Standard Deviation } S = \sqrt{1.900} = 1.378$$

##### 3. Test For Outliers

### Check for Critical "T" Values

$$T = \frac{|(\bar{x}_1 - \bar{\bar{x}})|^*}{S} = \frac{|3.96 - 5.328|}{1.378} = 0.99$$

\* Difference between the suspect test value ( $\bar{x}_1$ ) and the Mean ( $\bar{\bar{x}}$ ).

If the T value exceeds the critical "T" Value in the table below and no assignable cause can be determined for the outlier, discard the suspected test measurement and obtain another random sample from the Lot in question. If the new test exceeds the Mean ( $\bar{\bar{x}}$ ) in the same direction from the Mean as the suspected test, recalculate the T value including all tests (original test, suspected test, and new test) for an outlier and for computing final payment.

TABLE OF CRITICAL "T" VALUES

Number of observations (N)	Critical "T" Value 5% Significance Level
3	1.15
4	1.46
5	1.67
6	1.82
7	1.94
8	2.03
9	2.11
10	2.18
11	2.23
12	2.29

Based on the above table, the "T" value of 0.99 does not exceed the Critical "T" Value of 1.46 for N = 4. Therefore, the value (3.96) is not an outlier and shall be used in calculating the Lot payment.

#### 4. Calculation of Lot Payment

To calculate the Lot Payment use the Acceptance Criteria as outlined under Item 201-4.13(c) or Item 401-4.13(c).

$$Q_L = \frac{(\bar{\bar{x}} - 1)}{S} = \frac{5.328 - 1}{1.378} = 3.141$$

$$Q_U = \frac{(7 - \bar{\bar{x}})}{S} = \frac{7 - 5.328}{1.378} = 1.213$$

From this data the Percentage Within Tolerance (PWT) for both the lower and upper tolerance limits is determined by Table 8 of the specifications for the number (N) of samples tested.

$$\begin{aligned}\text{Eq. PWT (lower)} &= 99.0\% \\ \text{PWT (upper)} &= 90.4\%\end{aligned}$$

We now calculate the Percent Within Limits (PWL) for the Lot.

$$PWL = [PWT \text{ (lower)}] + [PWT \text{ (upper)}] - 100$$

$$PWL = (99.0 + 90.4) - 100 = 89.4\%$$

Using Table 7, the % Adjustment in Lot Quantity is:

$$\% \text{ Adjustment} = 0.5 \text{ PWL} + 55.0$$

$$\% \text{ Adjustment} = 0.5 (89.4) + 55.0$$

$$\% \text{ Adjustment} = 99.7$$

$$\text{Adjusted Quantities} = \% \text{ Adjustment} \times \text{Lot Quantities}$$

$$\text{Adjusted Quantities} = .997 \times 2000 \text{ tons}$$

$$\text{Adjusted Quantities} = 1994 \text{ tons}$$

#### 5. Resampling and Retesting

Under the specifications the contractor has the right to request the resampling and retesting of a complete Lot. This privilege is only allowed once for each Lot and must be requested in writing by the contractor within 48 hours of receiving the official report from the Engineer.

#### 6. Reporting

After completion of the tests for each Lot, the Engineer shall complete the necessary calculations for final adjustment in quantities on the Form AER M-1 and have both the Engineer and the Contractor sign the report for copying to both the FAA and IDOA.

Steven J. Long, P.E.  
Acting Chief Engineer

Supersedes Policy Memorandum 87-2, dated January 1, 1999.

State of Illinois  
Department of Transportation  
Division of Aeronautics

**POLICY MEMORANDUM**

January 1, 2004

Springfield

Number: **87-3**

TO: CONSULTING ENGINEERS

SUBJECT: MIX DESIGN, TEST BATCH, QUALITY CONTROL, AND ACCEPTANCE  
TESTING OF PCC PAVEMENT MIXTURE

I. SCOPE

This Policy Memorandum addresses the Mix Design, Test Batch, Quality Control and Acceptance Testing of PCC pavement mixtures specified by Item 501, Portland Cement Concrete Pavement, in accordance with the Standard Specifications for Construction of Airports, effective January 1985, Special Provisions, and policies of the Division of Aeronautics.

II. MIX DESIGN

The mix design is usually prepared by the Division of Aeronautics (IDOA), based on the material sources provided by the contractor or his subcontractor, utilizing the Division of Highways Concrete Mix Design procedures. The contractor may submit his own mix design, with substantiating test data, for consideration by IDOA.

The Mix Design and approved Job Mix Formula (JMF) will be issued by our office subject to verification of the mix by strength tests obtained from mix prepared from a Test Batch(es) according to the approved JMF. The water-cementitious ratio established from the approved test batch is the maximum water-cementitious ratio allowed during production paving.

III. TEST BATCH

At least 28 days prior to the start of production, the contractor and/or producer shall prepare a Test Batch under the direction of the Engineer. The Test Batch shall be prepared at the concrete plant proposed for use in the production of the concrete mix for the project and shall be in accordance with the approved Job Mix Formula (JMF). When approved by the Engineer, the Test Batch may be prepared at a different plant provided that the same materials specified in the JMF are used. The plant shall have been surveyed and approved by the Engineer prior to preparation of the Test Batch. As required by these Special Provisions, the contractor shall provide Quality Control for production of the concrete. The contractor shall have his Quality Control Manager and a representative of the contractor familiar with the paving operation, present at the Test Test Batch preparation. The Test Batch shall be prepared as follows:

A. Proportioning

Prior to preparation of the mix, the Proportioning Technician shall perform a minimum of two (2) gradation analysis and two (2) moisture tests on each aggregate used. The gradation analysis shall be reported on form AER M-12, Side 1. From this data, the JMF shall be adjusted for moisture, in accordance with form AER M-12, Side 2. A microwave type moisture probe (or equal) may be allowed to adjust proportions for sand moisture when approved by the Engineer.

B. Preparation of the Mix:

- 1.) Prepare a Test Batch that is at least one-half (1/2) the manufacturer's rated capacity of the mixing drum (in cubic yards). The Test Batch shall be prepared with the approved JMF, adjusted for moisture.
- 2.) Mixing requirements shall be:
  - a.) Central Mix Plant: Mixing time shall be a minimum of 90 seconds. If transit mixer trucks are used to transport the mix, the mix shall be agitated, after mixing, at 2-5 RPM for the approximate time anticipated between batching at the plant and deposit of the concrete in the forms.  
If non-mixing trucks are used to transport the mix, the mix shall remain in the central mixer with no mixing or agitation for the approximate time anticipated from when the water contacts the cement and deposit of the concrete in the forms.
  - b.) Transit Mix Plant: Mixing shall consist of 70-100 Revolutions @ 5-16 RPM. After initial mixing, agitate mix at 2-5 RPM for the approximate time anticipated between batching at the plant and deposit of the concrete in the forms.
- 3.) Slump and Air: If the air content after aging is  $6.0\% \pm 1.5\%$  and provides the required workability for paving, the contractor will make cylinders for testing at 3, 7, 14 and 28 days. If the slump is below that required for placement, the contractor may add additional water to increase the slump as necessary up to the maximum water/cement ratio (or water/cementitious material) ratio listed herein. Additional mixing of at least 40 Revolutions will be required with each addition of water. Cylinders and/or beams will be made for testing at 3, 7, 14 and 28 days when the slump is obtained, at  $6.0\% \pm 1.5\%$  air content. The water/cement ratio (or water/cementitious material) ratio cannot exceed 0.44 based on actual batch weights when 501-3.6(A) proportions is specified, and 0.42 when 501-3.6(B) proportions is specified.
- 4.) The Proportioning Technician shall complete Form AER M-7, Plastic Concrete Air, Slump and Quantity and Form AER M-6, Concrete Moisture Determination (Adjusted Oven Dry Method), to be given to the Resident Engineer after completion of the Test Batch. The Flask Method, Dunagan Method, and Pycnometer Jar Method are also acceptable test methods for the determination of aggregate moisture.
- 5.) The Resident Engineer and contractor shall complete Form AER M-4, Concrete Plant Production, Mix Verification.
- 6.) The concrete test cylinders and/or beams shall be tested at 3, 7, 14 and 28 days to establish a growth curve of concrete strength vs. age. The compressive strength shall be at least 800 psi, over the specified strength, at 28 days. Flexural strength concrete shall have at least 100 psi over the specified strength at 28 days.

IV. QUALITY CONTROL

Quality control testing is the responsibility of the contractor and must be performed by qualified testing personnel approved by the Engineer. The proportioning technician shall be PCC Level II certified by the testing firm must perform his or her duties on a full time basis whenever concrete is produced for an IDOA project.

The proportioning technician shall perform the duties as outlined in the Division of Highways latest Manual of Instructions for Concrete Proportioning and Testing and as outlined as follows. These duties as outlined are not necessarily all inclusive and may include other duties as required by the specifications, special provisions, etc.

If a QC or QA test for slump, air content, or mix temperature fails to meet the requirements of the specifications the contractor shall reject the batch. In the case of a failing air content, the contractor may make adjustments to the concrete to bring the air content into compliance with the specification. Adjustments are subject to the time limitations of 1 hour from time of batching when the concrete is transported in mixer trucks. Time limitations shall be increased by 30 minutes when the concrete mixture contains a retarding admixture. When concrete has been rejected due to failing test results, the contractor shall continue to run tests for the failed test parameter until at least 3 consecutive passing tests are achieved. This testing is in addition to the normal QC and QA testing.

A. Duties of the Proportioning Technician:

- 1.) Check and maintain shipment tickets of each material used in the manufacture of the concrete. These tickets are to be given to the Resident Engineer for each day's production of concrete. The aggregates shall indicate the quality on the ticket and a statement that the coarse aggregate is a non "D" cracking (freeze-thaw rated by IDOT) aggregate. In lieu of having these statements on each ticket, the contractor may use complete the Division's Aggregate Certification of Compliance form, or supply the Resident Engineer with a certification letter indicating the Quality and statement of non "D" cracking compliance.
- 2.) Inspect and maintain proper storage of all aggregates and materials daily.
- 3.) Perform at least one (1) sieve analysis for each aggregate daily.
- 4.) Inspect all weighing or measuring devices daily.
- 5.) Twice daily check the actual weighing or measuring of aggregates, cement, water, and admixtures for conformance to adjusted batch proportions. Record data on Form AER M-4, Concrete Plant Production, Mix Verification, and calculate the water/cement (or water/cementitious material) ratio.
- 6.) See that the volume of the batch does not exceed the allowable capacity of the mixer and that the proper mixing time is used.
- 7.) Make at least two (2) moisture tests of each aggregate daily and correct batch weights as required.
- 8.) Adjust the dosage rates of the admixtures as required to meet concrete temperature changes and paving conditions.
- 9.) Complete AER M-7, Concrete Air, Slump and Quantity, and Form AER M-4, Concrete Plant Production, Mix Verification for each day's production and deliver same to the Resident Engineer at the end of the day for which the data pertains. Provide to the Resident Engineer load tickets for all aggregates, cement, and admixtures used in the mix.

The Resident Engineer will also be required to visit the plant twice daily on a random basis to record actual batch weights and complete Form AER M-4, Concrete Plant Production, Mix Verification. Forms AER M-4, M-7, and M-12 shall be submitted to the R.E. on a daily basis and then faxed by the R.E. to the Division of Aeronautics daily. (FAX is (217) 785-4533.)

V. ACCEPTANCE TESTING

As required by Item 501-5.3 of the Standard Specifications, acceptance and payment of the final pavement is based on the strength of either cylinders or beams taken at random during the time of construction. The pavement shall be divided into Lots of 1200 cubic yards with sublots of 300 cubic yards each. One random sample (two cylinders or one beam) shall be obtained from each subplot for testing at 28 days to calculate final payment. At the time a subplot sample is taken, one (1) slump and one (1) air test shall be taken.

In addition to the above described sample frequency, three (3), seven (7) and fourteen (14) day tests shall be taken. The Engineer may require additional tests to maintain Quality Control.

Steven J. Long, P.E.  
Acting Chief Engineer

Supersedes Policy Memorandum 87-3, dated February 1, 2002.

State of Illinois  
Department of Transportation  
Division of Aeronautics

**POLICY MEMORANDUM**

January 1, 2004

Springfield

Number: **87-4**

TO: CONSULTING ENGINEERS

SUBJECT: DETERMINATION OF BULK SPECIFIC GRAVITY (d)  
OF COMPACTED BITUMINOUS MIXES

- A. SCOPE. This method of test covers the determination of the bulk specific gravity and the percent air, of core samples from compacted bituminous mixtures using a saturated surface-dry procedure.
- B. DEFINITIONS.
1. Bulk Specific Gravity ( $G_{sb}$ ) or density is the weight per unit volume (gms/cc) of a mixture in its existing state of consolidation. The volume measurement for this specific gravity will include the volume of all the aggregate, asphalt, and air spaces (voids) in the aggregate particles and between the aggregate particles.
  2. Theoretical Maximum Specific Gravity ( $G_{mm}$ ) ASTM 2041 is the weight per unit volume (grams/cc) of a mixture assuming complete consolidation; i.e., all the air spaces (voids) between the aggregate particles are eliminated.
  3. Percent Density is a measure of the degree of compaction in relation to the Theoretical Maximum Specific Gravity.
  4. Percent Air is a measure of the air voids in the compacted pavement.
- C. APPARATUS.
1. Balance - The balance shall be accurate to 0.1 gm throughout the operating range. It may be mechanical or electrical and shall be equipped with a suitable suspension apparatus and holder to permit weighing of the core in water while suspended from the balance. If the balance is a beam type, it shall be set up so that the core is placed in the basket that is suspended from the zero (0) end of the balance arm.
  2. Water bath - The container for immersing the core in water while suspended from the balance shall be equipped with an overflow outlet for maintaining a constant water level. This water bath should be large enough to handle full-depth cores. When testing several cores at the same time, a dish-pan, sink or suitable container may be used for soaking.
- D. PROCEDURE.
1. Prior to testing, cores shall be sorted on a flat surface in a cool place. The sample(s) shall be brushed with a wire brush and/or other suitable means, to remove all loose and/or foreign materials, such as seal coat, tack coat, foundation material, soil, paper, and foil, prior to testing.
  2. If a core contains binder and surface or multiple lifts, the lifts shall be separated. This may be done in the following manner:
    - a. Mark the separation line between the two lifts.

- b. Place the core in a freezer for 20-25 minutes.
  - c. Place a 2 or 3-inch wide chisel on the separation line and tap with a hammer. Rotate the core and continue this process until the core separates. Brush loose pieces with a wire brush if needed.
  - d. Allow 2-3 hours for the core to return to ambient temperature before proceeding.
3. Prepare the water baths for soaking and weighing with water at 77° F. Water baths should be maintained at this temperature throughout testing. Saturate the cores by submerging in the water for a minimum of 20 minutes.
  4. With the balance and water bath properly assembled and zeroed, suspend the sample from the balance and submerge it in the water bath. The core must be placed with the original top and bottom in a vertical position. If necessary, add sufficient water to bring the water level up to the overflow outlet. Permit any excess to overflow. Read and record the Saturated Submerged Weight. Designate this weight as (C).
  5. Remove the core from the water bath and blot the excess water from the surface of the core with an absorbent cloth or other suitable material. This must be done quickly to prevent the internal water from escaping.
  6. Place the core on the balance and read and record the Saturated Surface-dry Weight in air. Designate this weight as (B).
  7. Place the core in a tared pan and dry in an oven. When the core is dry, (less than 0.5 gm loss in one hour) record the weight and subtract the pan weight. Designate this weight as (A).
  8. The following calculation is used to determine the Bulk Specific Gravity of the core.

$$G_{sb} = \frac{A}{B-C}$$

$G_{sb}$  = Bulk Specific Gravity

A = Oven dry weight

B = Saturated surface-dry weight

C = Saturated submerged weight

- E. PERCENT DENSITY. The following calculation is used to determine the percent density of the core:

$$\% \text{ Density} = 100 \times \frac{G_{sb}}{G_{mm}}$$

$G_{sb}$  = Bulk Specific Gravity

$G_{mm}$  = Theoretical Maximum Gravity\*

Note: The Theoretical Maximum Gravity ( $G_{mm}$ ) is determined from the mix design until current Vacuum Pycnometer test are available.

- F. PERCENT AIR. To calculate the percent air, use the following formula:

$$\% \text{ Air} = 100 - \% \text{ Density}$$

- G. WEIGHT PER SQUARE YARD OF COMPACTED MIXTURE. The actual weight per square yard of a compacted mixture can be calculated by using the Bulk Specific Gravity ( $G_{sb}$ ). The volume of a square yard of pavement one (1) inch thick is 0.75 cubic foot. Taking the weight of a cubic foot of water as 62.37 pounds, one square yard of compacted material, one (1) inch thick weighs:

$$\text{Pounds Per Sq. Yd. (1" thick)} = 0.75 \times 62.37 \times G_{sb}$$

Steven J. Long, P.E.  
Acting Chief Engineer

Supersedes Policy Memorandum 87-4 effective January 1, 1994.

State of Illinois  
Department of Transportation  
Division of Aeronautics

**POLICY MEMORANDUM**

January 1, 2004

Springfield

Number: **90-1**

TO: CONSULTING ENGINEERS

SUBJECT: Resampling and Retesting of PCC Pavement

**I. PURPOSE**

1. This Policy Memorandum outlines the procedure for resampling and retesting of individual Lots of PCC Pavement for the determination of final Price Adjustment as permitted by the Special Provisions for Item 501 Portland Cement Concrete Pavement (Plain and Reinforced).

**II. RESAMPLING AND RETESTING.**

1. If the contractor should request the resampling and retesting of a LOT, he must notify the Engineer in writing within 24 hours of receiving the written test results and payment results for the LOT in question. The entire LOT must be resampled (no selective resampling of individual sublots will be allowed) and the contractor is not allowed to take additional cores. Once approval to resample has been granted, the Engineer will select random locations from each SUBLOT of the LOT in question and direct the contractor to drill two (2) 4 inch or 6 inch diameter cores from each location. The cores shall be obtained, cured and tested in accordance with ASTM C 42, Obtaining and Testing Drilled Cores and Sawed Beams of Concrete. The Engineer will take possession of the cores once they have been cut by the contractor.

**III. CALCULATION FOR PRICE ADJUSTMENT**

1. When Compressive Test Specification (501-3.6(A) Proportions) is specified. The two (2) specimens from each SUBLOT shall be averaged to constitute one SUBLOT sample. The Percent Within Limits (PWL) for the LOT shall then be calculated in accordance with Item 501-5.3, Price Adjustment, of the Special Provisions using the sampled core compressive strengths and the Compressive Test formula. The final Price Adjustment shall be based on the PWL calculated using the sampled core compressive strengths. The test results of the resampled pavement are final. All costs associated with resampling, including, but not limited to testing, curing, and coring the concrete samples shall be borne by the contractor, regardless as to whether the test results increase or decrease calculated payment quantity of concrete pavement.
2. When Flexural Test Specification (501-3.6(B) Proportions) is specified. The two (2) specimens from each SUBLOT shall be averaged to constitute one SUBLOT sample. The SUBLOT samples shall then be averaged to obtain a LOT average. In order for the contractor to increase concrete payment quantity back to 100%, the LOT average shall be at least 6500 psi, and no individual SUBLOT sample shall be less than 6000 psi. Both the LOT average and SUBLOT sample strength requirements must be met in order for the concrete payment quantity to change back to 100%.

If both requirements are not met, then the original concrete payment quantity calculated based on the Percent Within Limits (PWL) as outlined in 501-5.3, Price Adjustment, of the Special Provisions shall still apply. The test results of the resampled pavement are final. All costs associated with resampling, including, but not limited to testing, curing, and coring the concrete samples shall be borne by the contractor, regardless as to whether the test results increase or decrease calculated payment quantity of concrete pavement.

Steven J. Long, P.E.  
Acting Chief Engineer

Supersedes Policy Memorandum 90-1, dated January 1, 2001

**Illinois Department of Transportation  
Division of Aeronautics  
Materials Section**

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POLICY MEMORANDUM

January 1, 2004

Springfield

Number 95-1

TO: CONSULTING ENGINEERS

SUBJECT: FIELD TEST PROCEDURES FOR MIXER PERFORMANCE AND CONCRETE UNIFORMITY TESTS

I. SCOPE

These methods describe the procedures for obtaining and testing representative samples of fresh concrete in the field to determine the consistency and mixer efficiency of stationary mixers at different mixing time periods.

The concrete produced during the mixing time investigation and not used in the test program may be incorporated in the project provided it conforms to the Standard Specifications for Construction of Airports.

A maximum of two mixing times shall be considered by the Department.

The contractor shall provide all of the necessary equipment and personnel to perform the tests and the Department will observe the testing.

II. APPARATUS REQUIRED

- a. Three (3) air meters conforming to the requirements of ASTM C231 or ASTM C173.
- b. Three (3) slump cone kits conforming to ASTM C143.
- c. One (1) No. 4 sieve having a minimum screen area of 2 sq. ft. The sieve shall conform to the requirements of AASHTO M92.
- d. One (1) platform scale graduated in tenths of a pound having a capacity sufficient to perform tests herein after specified.
- e. One (1) hydraulic or mechanical testing machine conforming to the requirements of the specified testing method for the project (ASTM C39 or ASTM C78).
- f. Flexural strength specimen forms as required. The forms shall be nominally 6x6x30 inch. Means shall be provided for securing the base plate firmly to the mold. The inside surfaces of the mold shall be smooth and free from holes, indentations, or ridges. The sides, bottom, and ends shall be at right angles and shall be straight and true so that the specimens will not be warped. Maximum variation from the nominal cross-section shall not exceed 1/8 inch. The assembled mold and base plate shall be lightly coated with mineral oil or other approved form release oil before use. Compressive strength specimens shall be 6x12 inch and prepared in accordance with ASTM C31.

g. Sufficient water tanks for curing specimens as required by ASTM C31.

h. Small tools such as shovels, scoops, buckets, etc., and water shall be furnished, as required.

### III. MIXER

The mixer for which the mixing time is to be evaluated shall conform to the applicable sections of the Standard Specifications for Construction of Airports.

### IV. MIXING TIME REQUIREMENTS

The minimum mixing time to be evaluated shall be specified in the Standard Specifications for Construction of Airports.

### V. PROCEDURE

A minimum of ten (10) batches per drum shall be tested and evaluated for each original reduced mixing time request. Check tests shall consist of three (3) batches.

If the request is for a new, twin drum mixer, ten (10) batches shall be tested for the first drum and three (3) for the second drum.

Check tests are required if the mixer is moved, major maintenance performed, or if the source or type of aggregate has changed. A minimum frequency of check tests shall be one (1) per year.

#### a. Mixing Time

The mixing time and batch size to be evaluated shall be proposed by the contractor. The mixing time shall begin when all solid materials are in the mixing drum. The mixer timer shall register or indicate accurately the mixing time and a tolerance of two (2) seconds will be permitted.

If approved by the Engineer, minor adjustments in admixture dosage and water content will be allowed to account for weather conditions, provided that the maximum w/c ratio is not exceeded.

#### b. Sampling

At the conclusion of the mixing cycle, the mixer shall be discharged and appropriate samples obtained from the first, middle, and last third portions of the batch. Any appropriate method may be used, provided the samples are representative of the respective portions and not the very ends of the batch.

As an alternative, the mixer may be stopped, and the samples removed by any suitable means at equally spaced points from the front to the back of the drum.

#### c. Testing.

1. Each third portion of the batch shall be tested simultaneously. The Contractor shall provide sufficient personnel to meet this requirement. The Contractor personnel performing the testing shall be Level I PCC Technicians or Concrete Testers. However, a Level I PCC Technician shall be provided to supervise the Concrete Tester.

2. From each third portion of the batch the mass (weight) of the concrete in one air meter measuring bowl shall be determined.
3. The air content of each third portion of the batch shall be determined according to ASTM C231 or ASTM C173. The air content shall be the arithmetic average of two (2) tests from each third portion of the batch.
4. The slump of each third portion of the batch shall be determined according to ASTM C143. The slump shall be the arithmetic average of two (2) tests from each third portion of the batch.
5. Flexural strength specimen(s) (two (2) breaks required) or two (2) compressive strength specimens shall be prepared from each third portion of the batch according to ASTM C31. Flexural strength specimen(s) (two (2) breaks required) shall be tested according to ASTM C78 at seven (7) days of age. Compressive strength specimens shall be tested according to ASTM C39 at seven (7) days of age.
6. The contents from the weighed air meter measuring bowl shall be washed over a No. 4 sieve. Shake as much water as possible from the material retained on the sieve and then weigh the material. The coarse aggregate content (portion of mass (weight) of sample retained on a No. 4 sieve), expressed as a percent, shall be calculated.

## VI. CONCRETE UNIFORMITY REQUIREMENTS

- a. Test results from each third portion of the batch shall be compared to one another according to Table 1. Each batch shall be evaluated individually.
- b. Mixer performance tests consisting of ten (10) batches: If more than seven (7) tests out of the total or more than three (3) in any one criteria are not in compliance with the uniformity requirements (air content, slump, coarse aggregate content, and strength), a reduced mixing time will not be granted.
- c. Mixer performance tests consisting of three (3) batches: If more than three (3) tests out of the total are not in compliance with the uniformity requirements, a full ten (10) batch investigation shall be required.

**Table 1.** Requirements for Uniformity of Concrete

Test	Requirement (Note 1)
Air Content, percent by volume of concrete	1.0 (Note 2)
Slump, inch	1.0 (Note 3)
Coarse aggregate content, portion by weight of each sample retained on the No. 4 sieve, percent	6.0
Average flexural or compressive strength at 7 days for each sample based on average strength of all comparative test specimens, percent	7.5 (Note 4)

Note 1. Expressed as maximum permissible difference in results of tests of samples taken from three locations in the concrete batch.

Note 2. The average air content sample shall be the arithmetic average of two (2) tests.

Note 3. The average slump sample shall be the arithmetic average of two (2) tests.

Note 4. The average flexural strength of each sample shall be the arithmetic average of two (2) beam breaks. The average compressive strength of each sample shall be the arithmetic average of two (2) cylinder breaks.

Steven J. Long, P.E.  
Acting Chief Engineer

Supersedes Policy Memorandum 95-1 dated January 1, 1995

State of Illinois  
Department of Transportation  
Division of Aeronautics

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**POLICY MEMORANDUM**

January 1, 2004

Springfield

Number 96-1

TO: CONSULTING ENGINEERS

SUBJECT: ITEM 610, STRUCTURAL PORTLAND CEMENT CONCRETE:  
JOB MIX FORMULA APPROVAL & PRODUCTION TESTING.

- I. This policy memorandum addresses the Job Mix Formula (JMF) approval process and production testing requirements when Item 610 is specified for an airport construction contract.
- II. PROCESS
  - a. The contractor may submit a mix design with recent substantiating test data or he may submit a mix design generated by the Illinois Division of Highways with recent substantiating test data for approval consideration. The mix design should be submitted to the Resident Engineer.
  - b. The Resident Engineer should verify that each component of the proposed mix meets the requirements set forth under Item 610 of the *Standard Specifications for Construction of Airports* and/or the contract special provisions.
  - c. The mix design should also indicate the following information:
    1. The name, address, and producer/supplier number for the concrete.
    2. The source, producer/supplier number, gradation, quality, and SSD weight for the proposed coarse and fine aggregates.
    3. The source, producer/supplier number, type, and weight of the proposed flyash and/or cement.
    4. The source, producer/supplier number, dosage rate or dosage of all admixtures.
  - d. After completion of Items b and c above, the mix with substantiating test data shall be forwarded to the Division of Aeronautics for approval. Once the mix has been approved the production testing shall be at the rate in Section III as specified herein.

### III. PRODUCTION TESTING

- a. One set of cylinders or beams, depending on the strength specified, shall be cast for acceptance testing for each day the mix is used. In addition, at least one slump and one air test shall be conducted for each day the mix is used. If more than 100 c.y. of the mix is placed in a given day, additional tests at a frequency of 1 per 100 c.y. shall be taken for strength, slump, and air. In **no** case will concrete with a slump greater than 4 inches be allowed for use on the project.
- b. If the total proposed amount of Item 610 Structural Portland Cement Concrete as calculated by the Resident Engineer is less than 50 c.y. for the entire project, the following shall apply:
  - The Resident Engineer shall provide a copy of the calculations of the quantity of Item 610 to the Division of Aeronautics.
  - One set of cylinders or beams, depending the strength specified, shall be cast for acceptance testing.
  - One air content and one slump test shall be taken for acceptance testing.
  - In no case will concrete with a slump greater than 4 inches be allowed for use on the project.
- c. The Resident Engineer shall collect actual batch weight tickets for every batch of Item 610 concrete used for the project. The actual batch weight tickets shall be kept with the project records and shall be available upon request of the Department of Transportation.

Steven J. Long, P.E.  
Acting Chief Engineer

Supersedes Policy Memorandum 96-1 dated January 1, 2003

# STATE OF ILLINOIS

Department of Transportation  
Division of Aeronautics

## POLICY MEMORANDUM

April 1, 2004

Springfield, Illinois

Number 96-2

TO: CONTRACTORS

SUBJECT: REQUIREMENTS FOR LABORATORY, TESTING, QUALITY CONTROL, AND PAVING OF BITUMINOUS CONCRETE MIXTURES

### I. SCOPE

The purpose of this policy memorandum is to define to the Contractor the requirements concerning the laboratory, testing, Quality Control, and paving of bituminous concrete mixtures. References are made to the most recent issue of the Standard Specifications for Construction of Airports and to American Society for Testing and Materials (ASTM) testing methods. The Quality Assurance and acceptance responsibilities of the Engineer are described in Policy Memorandum 96-3.

### II. LABORATORY

The Contractor shall provide a laboratory located at the plant and approved by the Illinois Division of Aeronautics (IDA). The laboratory shall be of sufficient size and be furnished with the necessary equipment and supplies for adequately and safely performing the Contractor's Quality Control testing as well as the Engineer's acceptance testing as described in Policy Memorandum 96-3.

The effective working area of the laboratory shall be a minimum of 600 square feet with a ceiling height of not less than 7.5 feet. Lighting shall be adequate to illuminate all working areas. It shall be equipped with heating and air conditioning units to maintain a temperature of 70° F ± 5° F.

The laboratory shall have equipment that is in good working order and that meets the requirements set forth in the following ASTM test standards:

ASTM C 117	Test Method for Materials Finer than 75 µm (No. 200) Sieve in Mineral Aggregates by Washing
ASTM C 136	Sieve or Screen Analysis of Fine and Coarse Aggregate
ASTM C 566	Total Moisture Content of Aggregate by Drying
ASTM D 75	Sampling Aggregates
ASTM D 1559	Resistance to Plastic Flow of Bituminous Mixtures Using Marshall Apparatus
ASTM D 2041	Theoretical Maximum Specific Gravity and Density of Bituminous Paving Mixtures
ASTM D 2172	Quantitative Extraction of Bitumen from Bituminous Paving Mixtures
IDOT	Ignition Method for Determining Asphalt Content

ASTM D 2726	Bulk Specific Gravity of Compacted Bituminous Mixtures using Saturated Surface Dry Specimens
ASTM D 3203	Percent Air Voids in Compacted Dense and Open Bituminous Paving Mixtures
ASTM D 2950	Density of Bituminous Concrete in Place by Nuclear Method
ASTM D 4125	Asphalt Content of Bituminous Mixtures by Nuclear Method
ASTM C 127	Standard Test Method for Specific Gravity and Absorption of Coarse Aggregate
ASTM C 128	Standard Test Method for Specific Gravity and Absorption of Fine Aggregate

The Asphalt Institute's *Mix Design Methods for Asphalt Concrete Manual No. 2 (MS-2)*

The laboratory and equipment furnished by the Contractor shall be properly calibrated and maintained. The Contractor shall maintain a record of calibration results at the laboratory. The Engineer may inspect measuring and testing devices at any time to confirm both calibration and condition. If the Resident Engineer determines that the equipment is not within the limits of dimensions or calibration described in the appropriate test method, the Engineer may stop production until corrective action is taken. If laboratory equipment becomes inoperable or insufficient to keep up with mix production testing, the Contractor shall cease mix production until adequate and/or sufficient equipment is provided.

### III. MIX DESIGN TESTING

The Mix Design letter with accompanying approved Job Mix Formula (JMF) will be issued by the IDA Engineer of Materials. The Contractor will be required to perform the sampling and laboratory testing for the mix design according to the following guidelines: [Note: A testing summary chart can be found in Appendix B.]

- A. Material sources meeting the requirements of the contract shall be submitted in writing at or before the preconstruction conference in the following format:
  1. To: Steve Long, Acting Chief Engineer  
Attn: Mike Wilhelm, Engineer of Materials  
Division of Aeronautics  
One Langhorne Bond Drive  
Springfield, Illinois 62707
  2. Producer name and location of each aggregate
3. Producer # for each aggregate (producers are assigned this number by IDOT Central Bureau of Materials)
  4. Material code for each aggregate
  5. Gradation and Quality designation for each aggregate (i.e. CA-11, etc.)
  6. Producer, producer #, and specific gravities of asphalt cement

7. Performance Graded Binder 64-22 shall be used unless otherwise approved by the IDA Engineer of Materials.
- B. The Contractor shall obtain representative samples of each aggregate. The individual obtaining samples shall have successfully completed the IDOT Aggregate Technician Course under the IDOT Division of Highways, QC/QA program. The sample size shall be approximately 280 lb. for each coarse aggregate, 150 lb. for each fine aggregate, 15 lb. for the mineral filler or collected dust, and 1 gallon of asphalt cement.
- C. The Contractor shall split the aggregate samples down and run gradation tests according to the testing methods referenced in Appendix B of this memorandum. The remaining aggregates shall be set aside for further Mix Design testing. The results of the gradation tests, along with the most recent stockpile gradations, shall be reported by fax to the IDA Engineer of Materials for engineering evaluation. If the gradation results are deemed non-representative or in any way unacceptable, new representative samples may be required at the direction of the IDA Engineer of Materials. Only composite gradations are required under this procedure.
- D. Based on the accepted gradation results, the IDA Engineer of Materials will return blend percentages for each aggregate to be used in determining the Job Mix Formula. In addition, the Engineer of Materials shall specify directions for mix temperature and asphalt content(s), and number of Marshall Blows for preparation of the Marshall Mix Design.
- E. After receipt of the information from step D., the Contractor shall make specimens and perform the following tests for each asphalt content specified by the Engineer. [Note: Actual test designation is referenced in Appendix B of this memorandum.]

**Marshall Tests**

Maximum Specific Gravity -- " $G_{mm}$ "  
Bulk Specific Gravity -- " $G_{sb}$ "  
Marshall Stability  
Marshall Flow  
% air voids

- F. All technicians who will be performing mix design testing and plant sampling/testing shall have successfully completed the IDOT Division of Highways Bituminous Concrete Level 1 Technician Course "Bituminous Concrete Testing". The Contractor may also provide a Gradation Technician who has successfully completed the Department's "Gradation Technician Course" to run gradation tests only under the supervision of a Bituminous Concrete Level 2 Technician.
- G. The mix design testing results shall be reported to the IDA Engineer of Materials.
- H. The IDA Engineer of Materials shall generate and issue the approved Mix Design with the Job Mix Formula (JMF) for the manufacture of bituminous mixtures using the Contractor's testing results.
- I. The above procedure, III. MIX DESIGN TESTING, shall be repeated for each change in source or gradation of materials.

#### IV. MIX PRODUCTION TESTING

The Quality Control of the manufacture and placement of bituminous mixtures is the responsibility of the Contractor. The Contractor shall perform or have performed the inspection and tests required to assure conformance to contract requirements. Quality Control includes the recognition of defects and their immediate correction. This may require increased testing, communication of test results to the plant or the job site, modification of operations, suspension of bituminous mix production, rejection of material, or other actions as appropriate. The Resident Engineer shall be immediately notified of any failing tests and subsequent remedial action. Form AER M-14 shall be reported to the Engineer and Resident Engineer no later than the start of the next work day. In addition, AER M-9 and M-11 shall be given to the Resident Engineer daily (Appendix A). The Contractor shall provide a Quality Control (QC) Manager who will have overall responsibility and authority for Quality Control. This individual shall have successfully completed the IDOT Division of Highways Bituminous Concrete Level II Technician Course "Bituminous Concrete Proportioning and Mixture Evaluation." In addition to the QC Manager, the Contractor shall provide sufficient and qualified personnel to perform the required visual inspections, sampling, testing, and documentation in a timely manner. The following plant tests and documentation shall be required: [Note: A summary chart of testing can be found in Appendix B.]

- A. Minimum of one (1) complete hot bin or combined belt analysis per day of production or every 1,000 tons, whichever is more frequent.
- B. Minimum one (1) stockpile gradation for each aggregate and/or mineral filler per week when a batch plant is utilized. Minimum of one (1) gradation for each aggregate per day of production or every 1,000 tons when a drum plant is used, and one (1) gradation per week for mineral filler when a drum plant is used.
- C. A certification from the quarry for the total quantity of aggregate listing the source, gradation type, and quality designation of aggregate shipped.
- D. Original asphalt shipping tickets listing the source and type of asphalt shipped.
- E. One mix sample per 1,000 tons of mix. The sample shall be split in half. One half shall be reserved for testing by the Engineer. The other half shall be split and tested by the Contractor for Marshall, Extraction, Gradation, Maximum Specific Gravity, and Air Void tests in accordance with the appropriate ASTM standard referenced herein. [See Appendix B.]
  - 1. In place of the extraction test, the Contractor may provide the asphalt content by a calibrated ignition oven test using the IDOT Division of Highways' latest procedure. The correction (calibration) factor for aggregate type shall be clearly indicated in the reported test results.

From these tests, the Contractor shall interpret the test data and make necessary adjustments to the production process in order to comply with the approved JMF.

## V. QUALITY CONTROL

### A. Control Limits

Target values shall be determined from the approved JMF. The target values shall be plotted on the control charts within the following control limits:

<u>Parameter</u>	<u>Control Limits</u>	
	<u>Individual Test</u>	<u>Moving Avg. of 4</u>
% Passing		
1/2 in.	± 7 %	± 4 %
No. 4	± 7 %	± 4 %
No. 8	± 5 %	± 3 %
No. 30	± 4 %	± 2.5 %
No. 200 *	± 2.0 % *	± 1.0 % *
Asphalt Content	± 0.45 %	± 0.2 %

\* No. 200 material percents shall be based on washed samples. Dry sieve gradations (-200) shall be adjusted based on anticipated degradation in the mixing process.

### B. Control Charts

Standardized control charts shall be maintained by the Contractor at the field laboratory. The control charts shall be displayed and be accessible at the field laboratory at all times for review by the Engineer. The individual required test results obtained by the Contractor shall be recorded on the control chart immediately upon completion of a test, but no later than 24 hours after sampling. Only the required plant tests and resamples shall be recorded on the control chart. Any additional testing of check samples may be used for controlling the Contractor's processes, but shall be documented in the plant diary.

The results of assurance tests performed by the Engineer will be posted as soon as available.

The following parameters shall be recorded on control charts:

1. Combined Gradation of Hot-Bin or Combined Belt Aggregate Samples (Drier Drum). (% Passing 1/2 in., No. 4., No. 8, No. 30, and No. 200 Sieves)
2. Asphalt Content
3. Bulk Specific Gravity of Marshall Sample
4. Maximum Specific Gravity of Mixture

### C. Corrective Action for Required Plant Tests

Control Limits for each required parameter, both individual tests and the average of four tests, shall be exhibited on control charts. Test results shall be posted within the time limits previously outlined.

1. Individual Test Result. When an individual test result exceeds its control limit, the Contractor shall immediately resample and retest. If at the end of the day no material remains from which to resample, the first sample taken the following day shall serve as the resample as well as the first sample of the day. This result shall be recorded as a retest. If the retest passes, the Contractor may continue the required plant test frequency. Additional check samples should be taken to verify mix compliance.
2. Asphalt Content. If the retest for asphalt content exceeds control limits, mix production shall cease and immediate corrective action shall be instituted by the Contractor. After corrective action, mix production shall be restarted, the mix production shall be stabilized, and the Contractor shall immediately resample and retest. Mix production may continue when approved by the Engineer. The corrective action shall be documented.

Inability to control mix production is cause for the Engineer to stop the operation until the Contractor completes the investigation identifying the problems causing failing test results.

3. Combined Aggregate/Hot-Bin. For combined aggregate/hot-bin retest failures, immediate corrective action shall be instituted by the Contractor. After corrective action, the Contractor shall immediately resample and retest. The corrective action shall be documented.
  - a. Moving Average. When the moving average values trend toward the moving average control limits, the Contractor shall take corrective action and increase the sampling and testing frequency. The corrective action shall be documented.

The Contractor shall notify the Engineer whenever the moving average values exceed the moving average control limits. If two consecutive moving average values fall outside the moving average control limits, the Contractor shall cease operations. Corrective action shall be immediately instituted by the Contractor. Operations shall not be reinstated without the approval of the Engineer. Failure to cease operations shall subject all subsequently produced material to be considered unacceptable.
  - b. Mix Production Control. If the Contractor is not controlling the production process and is making no effort to take corrective action, the operation shall stop.

## VI. TEST SECTION AND DENSITY ACCEPTANCE **(Note: Applies only when specified.)**

- A. The purpose of the test section is to determine if the mix is acceptable and can be compacted to a consistent passing density.

A quick way to determine the compactibility of the mix is by the use of a nuclear density gauge in the construction of a growth curve. An easy way to construct a growth curve is to use a good vibratory roller. To construct the curve, an area the width of the roller in the middle of the mat is chosen and the roller is allowed to make one compactive pass. With the roller stopped some 30 feet away, a nuclear reading is taken and the outline of the gauge is marked on the pavement. The roller then makes a compaction pass in the opposite direction and another reading is taken. This scenario is continued until at least two (2) passes are made past the maximum density obtained.

The maximum laboratory density potential of a given mix is a direct function of the mix design air voids. Whereas, the actual maximum field density is a function of the type of coarse aggregates, natural or manufactured sands, lift thickness, roller type (static or vibratory), roller and paver speed, base condition, mix variation, etc. All of these items are taken into consideration with the growth curve.

1. High Density in the Growth Curve. If the growth curve indicates a maximum achievable field density of between 95 to 98 percent of the Theoretical Maximum Density (D), you can proceed with the Rolling Pattern. On the other hand, if the maximum achievable density is greater than 98 percent, a quick evaluation (by use of an extractor, hot bin gradations, nuclear asphalt determinator, etc.) must be made of the mix. When adjustments are made in the mix, a new growth curve shall be constructed.
2. Low Density in the Growth Curve. If the growth curve indicates the maximum achievable density is below 94 percent, a thorough evaluation of the mix, rollers, and laydown operations should be made. After a thorough evaluation of all factors (mix, rollers, etc.), asphalt or gradation changes may be in order as directed by the Engineer. Again, any changes in the mix will require a new growth curve. Note that the nuclear density test is a quality control tool and not an acceptance test. All acceptance testing is to be conducted by the use of cores, unless otherwise specified.
3. Acceptance of Test Section. The Contractor may proceed with paving the day after the test section provided the following criteria have been met:
  - a. Four random locations (2 cores per location cut longitudinally and cored by the Contractor) will be selected by the Engineer within the test strip. The cores must show a minimum of 94% density.
  - b. All Marshall and extraction test results from mix produced for the test section must be within the tolerances required by specification.
  - c. The Contractor shall correlate his nuclear gauge to the cores taken in the test section. Additional cores may be taken at the Contractor's expense for this purpose within the test section area, when approved by the Engineer.
4. Density Acceptance under Production Paving. The responsibility for obtaining the specified density lies with the Contractor. Therefore, it is important that the nuclear density gauge operator communicate with the roller operators to maintain the specified density requirements. The Contractor shall provide a Bituminous Concrete Density Tester who has successfully completed the Department's "Bituminous Concrete Nuclear Density Testing Course" to run all required density tests on the job site. Density acceptance testing, unless otherwise specified, is described as follows:
  - a. The Contractor shall cut cores at random locations within 500 ton sublots as directed by the Resident Engineer.
  - b. The cores should be extracted so as not to damage them, since they are used to calculate the Contractor's pay.
  - c. The Engineer will run preliminary  $G_{mb}$  tests on the cores to give the Contractor an indication of how compaction is running for the next day's paving.

- d. A running average of four (4) Maximum Theoretical Gravities ( $G_{mm}$ ) will be used for calculating percent compaction.
- e. Final core density tests and pay calculations will be performed by the Resident Engineer and delivered to the Contractor.

Steven J. Long, P.E.  
Acting Chief Engineer

Supersedes Policy Memorandum 96-2 dated April 1, 2003

# APPENDIX A

## BITUMINOUS WORKSHEET

Airport: \_\_\_\_\_ Project No.: \_\_\_\_\_ AIP No.: \_\_\_\_\_

Mix Design # : \_\_\_\_\_ Material Code: \_\_\_\_\_ Producer: \_\_\_\_\_  
Prod. #: \_\_\_\_\_

### AGGREGATE

Mat'l. Code: \_\_\_\_\_

Producer #: \_\_\_\_\_

Prod. Name \_\_\_\_\_

Location: \_\_\_\_\_

### Percent Passing

#### Sieve Size

1 inch					
3/4 inch					
1/2 inch					
3/8 inch					
No. 4					
No. 8					
No. 16					
No. 30					
No. 50					
No. 100					
No. 200					
Washed (y/n)					
O.D. Gravity					
App. Gravity					
Absorption					
Asphalt Gravity					
Asphalt Source					
Asphalt Producer No.					

### MARSHALL DATA

% Asphalt					
M. Stability					
Flow					

## Bituminous Mixture Daily Plant Output

Tons/Hr.	Batch Wt.	Batches	Loads	Tons	Mix No.	Date: _____
						Airport: _____
AC Prod.	Material	% Mix	Add Prod	Material	% AC	Ill. Project: _____
						AIP Project: _____
Temp. (F)	Agg Drier	Agg Bin	Asphalt	Bit. Mix	Bit. Mix	
Max					(RE/RT)	Consultant: _____
Min						Contractor: _____
Wtd. Avg.						Producer: _____

Mix Time	Dry	Wet	Total	Plant Oper.	Start	Stop	Delays	Hrs
Contract		Job No.	Qty	Contract		Job No.	Qty.	

Remarks \_\_\_\_\_

Bin	RAP	Bin 5	Bin 4	Bin 3	Bin 2	Bin 1	M.F.	New Bit	Wash	Changed
Mix %										
Lb/Bt-Rev									Mix Form	Spec Range
Agg %								% Pass		
1.5	Wt %									
	% Bin									
1	Wt %									
	% Bin									
3/4	Wt %									
	% Bin									
1/2	Wt %									
	% Bin									
3/8	Wt %									
	% Bin									
4	Wt %									
	% Bin									
8	Wt %									
	% Bin									
16	Wt %									
	% Bin									
30	Wt %									
	% Bin									
50	Wt %									
	% Bin									
100	Wt %									
	% Bin									
200	Wt %									
	% Bin									
Bit.										
AC - Prod	Ac-Code	Ticket	Date	Qty	AC-Prod	AC-Code	Ticket	Date	Qty	

# Bituminous Mixtures Extraction

Date: \_\_\_\_\_

Airport: \_\_\_\_\_ Consultant: \_\_\_\_\_

Illinois Project: \_\_\_\_\_ Contractor: \_\_\_\_\_

AIP Project No.: \_\_\_\_\_ Producer: \_\_\_\_\_

Mix #: \_\_\_\_\_ Dry Time: \_\_\_\_\_ Lot: \_\_\_\_\_ Sublot: \_\_\_\_\_

Type: \_\_\_\_\_ Washed: \_\_\_\_\_

Sieve	Wt.	Accum. Wt.	% Passing	Mix Formula	Tolerance	Spec Range
1.5						
1						
3/4						
1/2						
3/8						
4						
8						
16						
30						
50						
100						
200						
Tot Agg						
Bit						

Extraction Data		
Pan, New Filter & Sample	g	_____
Pan & New Filter	g	_____
Sample	g	_____
Pan, Used Filter, Aggregate	g	_____
Pan & New Filter	g	_____
Aggregate	g	_____
Pan & Used Filter	g	_____
Pan & New Filter	g	_____
Dust in Filter	g	_____
Sample	g	_____
Aggregate	g	_____
Bitumen	g	_____

New Bit:	Marshall Stab:	Blows:	Gyro:	Flow:	TSR:
Bulk SPGR:	Max SPGR:	% Voids:	DEN (PCF):		

Remarks: \_\_\_\_\_

CC: \_\_\_\_\_ Tested by: \_\_\_\_\_

AERM-11

## Bituminous Testing Summary

Illinois Project: \_\_\_\_\_

AIP Proj.:

Contractor:

Remarks:

[illegible]

# APPENDIX B

**QUALITY CONTROL TESTING (PLANT)**

<b>PARAMETER</b>	<b>FREQUENCY</b>	<b>SAMPLE SIZE</b>	<b>TEST METHOD</b>	<b>REPORT FORM</b>
Aggregate Gradations: Hot bins for batch and continuous plants--- Individual cold-feeds or combined belt-feeds for drier drum plants.	Minimum 1 per day of production and at least 1 per 1000 tons.	CA07/11: 5000 gm CA13: 2000 gm CA16: 1500 gm Fine agg: 500 gm 1 gallon asphalt cement	ASTM C 136	AER M-9
Aggregate gradations: Stockpiles	Minimum 1 per aggregate per week per stockpile.	CA07/11: 5000 gm CA13: 2000 gm CA16: 1500 gm Fine agg: 500 gm *Note: The above test sample sizes are to be obtained from splitting down a larger sample from the stockpiles.	ASTM C 136	AER M-9
Maximum Specific Gravity	Minimum 1 per 1000 tons	1200 gm per test	ASTM D 2041	AER M-11 and AERM-14
Bulk Specific Gravity	Minimum 1 per 1000 tons	1250 gm per briquette	ASTM D 2726	AER M-11 and AERM-14
Marshall Stability and Flow	Minimum 1 per 1000 tons	1250 gm per briquette	ASTM D 1559	AER M-11 and AERM-14
% Air Voids	Minimum 1 per 1000 tons		ASTM D 3203	AER M-11 and AERM-14
Extraction	Minimum 1 per 1000 tons	1000 gm (surface) 1500 gm (base)	ASTM D 2172	AER M-11 and AERM-14
Ignition Oven Test	Minimum 1 per 1000 tons	1500 gm		AER M-14
Nuclear Asphalt Gauge	Minimum 1 per 1000 tons	1000-1100 gm	ASTM D 2145	AER M-14

**MIX DESIGN TESTING**

<b>PARAMETER</b>	<b>FREQUENCY</b>	<b>SAMPLE SIZE</b>	<b>TEST METHOD</b>	<b>REPORT FORM</b>
Representative samples of each aggregate and asphalt cement.	1 per aggregate and 1 asphalt cement.	280 lb. (coarse) 150 lb. (fine) 15 lb. (min. filler) 1 gallon asphalt cement	ASTM D 75	N/A
Aggregate Gradation	1 per aggregate	CA07/11: 5000 gm CA13: 2000 gm CA16: 1500 gm Fine agg: 500 gm	ASTM C 136	Bituminous Worksheet (Appendix A)
Maximum Specific Gravity	2 per specified asphalt content	1200 gm per test	ASTM D 2041	Bituminous Worksheet (Appendix A)
Bulk Specific Gravity	3 briquettes per specified asphalt content	1250 gm per briquette	ASTM D 2726	Bituminous Worksheet (Appendix A)
Marshall Stability and Flow	3 briquettes	1250 gm per briquette	ASTM D 1559	Bituminous Worksheet (Appendix A)
% Air Voids	1 per specified asphalt content (Avg. of $G_{sb}/G_{mm}$ )		ASTM D 3203	Bituminous Worksheet (Appendix A)

**QUALITY CONTROL TESTING (PAVER)**

<b>PARAMETER</b>	<b>FREQUENCY</b>	<b>SAMPLE SIZE</b>	<b>TEST METHOD</b>	<b>REPORT FORM</b>
Nuclear Density Test	As required by the Contractor to amintain consistent passing density	Various locations	ASTM D 2950	

State of Illinois  
Department of Transportation  
Division of Aeronautics

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**POLICY MEMORANDUM**

January 1, 2004

Springfield, Illinois

Number 96-3

TO: CONSULTING ENGINEERS

SUBJECT: REQUIREMENTS FOR QUALITY ASSURANCE ON PROJECTS  
WITH BITUMINOUS CONCRETE PAVING

I. SCOPE

The purpose of this policy memorandum is to define to the Consulting Engineer the requirements concerning Quality Assurance on bituminous concrete paving projects. Specifically, this memo applies whenever the Contractor is required to comply with the requirements set forth in Policy Memorandum 96-2, *"Requirements for Laboratory, Testing, Quality Control, and Paving of Bituminous Concrete Mixtures"*.

II. LABORATORY APPROVAL

The Resident Engineer shall review and approve the Contractor's plant laboratory to assure that it meets the requirements set forth in the contract specifications and Policy Memorandum 96-2. This review and approval shall be completed prior to utilization of the plant for the production of any mix.

III. QUALITY ASSURANCE DURING PRODUCTION PAVING

- A. At the option of the Engineer, independent assurance tests may be performed on split samples taken by the Contractor for Quality Control testing. In addition, the Resident Engineer shall witness the sampling and splitting of these samples at the start of production and as needed throughout mix production. The Engineer may select any or all split samples for assurance testing. These tests may be performed at any time after sampling. The test results will be made available to the Contractor as soon as they become available.

B. The Resident Engineer may witness the sampling and testing being performed by the Contractor. If the Resident Engineer determines that the sampling and Quality Control tests are not being performed according to the applicable test procedures, the Engineer may stop production until corrective action is taken. The Resident Engineer will promptly notify the Contractor, both verbally and in writing, of observed deficiencies. The Resident Engineer will document all witnessed samples and tests. The Resident Engineer may elect to obtain samples for testing, separate from the Contractor's Quality Control process, to verify specification compliance.

1. Differences between the Contractor's and the Engineer's split sample test results will be considered acceptable if within the following limits:

<u>Test Parameter</u>	<u>Acceptable Limits of Precision</u>
% Passing	
1/2 in.	5.0 %
No. 4	5.0 %
No. 8	3.0 %
No. 30	2.0 %
No. 200	2.2 %
Asphalt Content	0.3 %
Maximum Specific Gravity of Mixture	0.026
Bulk Specific Gravity of Marshall Sample	0.045

2. In the event a comparison of the required plant test results is outside the above acceptable limits of precision, split or independent samples fail the control limits, an extraction indicates non-specification mix, or a continual trend of difference between Contractor and Engineer test results is identified, the Engineer will immediately investigate. The Engineer may suspend production while the investigation is in progress. The investigation may include testing by the Engineer of any remaining split samples or a comparison of split sample test results on the mix currently being produced. The investigation may also include review and observation of the Contractor's technician performance, testing procedure, and equipment. If a problem is identified with the mix, the Contractor shall take immediate corrective action. After corrective action, both the Contractor and the Engineer shall immediately resample and retest.

- C. The Contractor shall be responsible for documenting all observations, records of inspection, adjustments to the mixture, test results, retest results, and corrective actions in a bound hardback field book or bound diary which will become the property of IDA upon completion and acceptance of the project. The Contractor shall be responsible for the maintenance of all permanent records whether obtained by the Contractor, the Contractor's Consultants, or the producer of bituminous mix material. The Contractor shall provide the Engineer full access to all documentation throughout the progress of the work.

Results of adjustments to mixture production and tests shall be recorded in duplicate and sent to the Engineer.

#### IV. ACCEPTANCE BY ENGINEER

Density acceptance shall be performed according to Policy Memorandum 87-2, or according to the acceptance procedure outlined in the Special Provisions.

Steven J. Long, P.E.  
Acting Chief Engineer

Supersedes Policy Memorandum 96-3 dated January 1, 1997

State of Illinois  
Department of Transportation  
Division of Aeronautics

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**POLICY MEMORANDUM**

January 1, 2004

Springfield, Illinois

Number 97-2

TO: CONSULTING ENGINEERS

SUBJECT: PAVEMENT MARKING PAINT ACCEPTANCE

I. SCOPE

The purpose of this policy memorandum is to define the procedure for acceptance of pavement marking paint.

II. RESIDENT ENGINEER'S DUTIES

The Resident Engineer shall follow the acceptance procedure outlined as follows:

- A. Require the painting contractor to furnish the name of the paint manufacturer and the batch number proposed for use prior to beginning work. Notify the I.D.A. Materials Certification Engineer when this information is available.
- B. Require the manufacturer's certification before painting begins. Check the certification for compliance to the contract specifications.
  - 1. The certification shall be issued from the manufacturer and shall include the specification and the batch number.
  - 2. The paint containers shall have the manufacturer's name, the specification and the batch number matching the certification.
- C. If no batch number is indicated on the certification or containers, sample the paint according to the procedure for the corresponding paint type.
- D. If the I.D.A. Engineer of Materials indicates that batch number has not been previously sampled and tested, sample the paint according to the procedure for the corresponding paint type. The Division of Aeronautics will provide paint cans upon request by the Resident Engineer. Samples will only be taken in new epoxy lined cans so that the paint will not be contaminated. It is important to seal the sample container immediately with a tight cover to prevent the loss of volatile solvents.

Mark the sample cans with the paint color, manufacturer's name, and batch number. The paint samples and manufacturer's certification shall be placed in the mail within 24 hours after sampling. Address the samples to the Materials Certification Engineer at:

Illinois Department of Transportation  
Division of Aeronautics  
One Langhorne Bond Drive  
Springfield, Illinois 62707

#### Sampling Procedures for Each Paint Type:

1. Waterborne or Solvent Base Paints
  - a. Take the paint sample from the spray nozzle when the contractor begins marking. A sample consists of two one-pint cans taken per batch number.
  - b. Be sure to indicate to the contractor that acceptance of material is based upon a passing test of the paint material.
2. Epoxy Paint
  - a. Take separate one-pint samples of each paint component prior to marking. Before drawing samples, the contents of each component's container must be thoroughly mixed to make certain that any settled portion is fully dispersed. **Do not combine the two components or sample from the spray nozzle.**
  - b. Be sure to indicate to the contractor that acceptance of material is based upon a passing test of the paint material.

### III. TESTING

The paint will be tested for acceptance by the IDOT Bureau of Materials and Physical Research for conformance to the contract specifications.

Steven J. Long, P.E.  
Acting Chief Engineer

Supersedes policy memorandum 97-2 dated February 27, 2002

State of Illinois  
Department of Transportation  
Division of Aeronautics

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**POLICY MEMORANDUM**

January 1, 2004

Springfield

Number 2001-1

TO: CONTRACTORS

SUBJECT: REQUIREMENTS FOR COLD WEATHER CONCRETING

I. PURPOSE

- A. This policy memorandum outlines the minimum requirements for cold weather concreting. Cold weather is defined as whenever the average ambient air temperature during day or night drops below 40°F.

II. COLD WEATHER CONCRETING PLAN

- A. The contractor shall submit a cold weather concreting plan to the Engineer for approval. Cold weather concreting operations are not allowed to proceed until the contractor's cold weather concreting plan has been approved by the Engineer.
- B. The contractor's plan shall be in compliance with this memorandum and shall address, as a minimum, the following:
1. *Concrete Mix Manufacturing*
  2. Concrete Mix Temperature Monitoring
  3. Base Preparation
  4. Concrete Curing and Protection
  5. In Place Concrete Temperature Monitoring
  6. Strength Test Specimens

III. MINIMUM REQUIREMENTS

A. Concrete Mix Manufacturing

1. The contractor must make the necessary adjustments so that the concrete temperature is maintained from 50°F to 90°F for placement. Acceptable methods include:
  - a) Heating the mixing water Note: If the mixing water is to be heated to a temperature above 100°F, the contractor must include a mixing sequence plan to indicate the order that each component of the mix is to be charged into the mixer.

- b) Heating the aggregates Note: The exact method of heating the aggregates shall be included as part of the cold weather concreting plan. Aggregates must be free of ice and frozen lumps. To avoid the possibility of a quick or flash set of the concrete, when either the water or aggregates are heated to above 100°F, they should be combined in the mixer first before the cement is added.

#### B. Concrete Mix Temperature

1. The contractor shall monitor the mix temperature at the plant and prior to placement in the forms. Mix that does not meet the temperature requirement of 50°F to 90°F shall be rejected for use on the project.

#### C. Base Preparation

1. Paving or placing concrete on a frozen base, subbase, or subgrade is prohibited.
2. The base, subbase, or subgrade on which the concrete is to be placed shall be thawed and heated to at least 40°F. The method by which the base subbase or subgrade is to be heated shall be indicated in the contractors cold weather concreting plan. Insulating blankets or heated enclosures may be required.

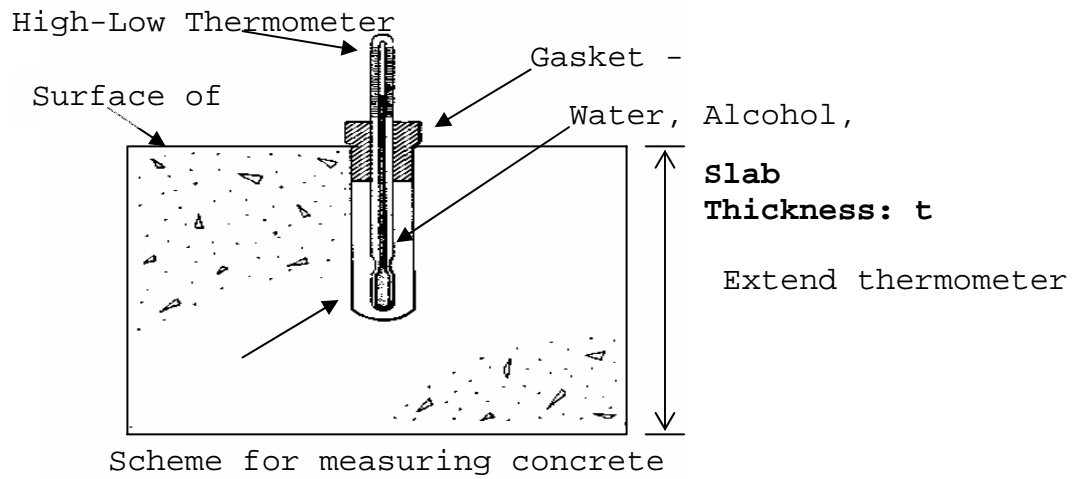
#### D. Concrete Protection and Curing

1. In addition to the curing options available in article 501-3.17 (a) (b), (c), and (d) of the Standard Specifications for Construction of Airports, the contractor shall protect the concrete in such a manner as to maintain a concrete temperature of at least 50°F for 10 days.
2. The method of concrete protection shall be by use of insulating layer or heated enclosure around the concrete. The method of protection shall be indicated in the contractor's cold weather concreting plan. When insulating layers are to be used, the thermal resistance to heat transfer (R Value in °F\*hr\*ft<sup>2</sup>/BTU) of the insulation material selected, shall be appropriate for the slab thickness being constructed and shall be indicated in the cold weather concreting plan.
3. Appendix A shows a chart and table taken from the American Concrete Institute specification, ACI 306 R Cold Weather Concreting, which may be used by the contractor in selecting the proper insulation (R Value) and insulating material which may be used.

#### E. In-Place Concrete Temperature Monitoring

1. Once the concrete is in place, the protection method used, must ensure that the concrete temperature does not fall below 50°F for the time period specified in Section (D. 1.) of this Policy Memorandum (10 days).
2. The concrete temperature on the surface and below the surface must be monitored and recorded by the contractor for the duration of the protection period in Section (D. 1.).
3. After the concrete has hardened, surface temperature can be checked with special surface thermometers or with an ordinary thermometer that is kept covered with insulating blankets. The high and low values for each 24-hour period of protection must be measured and recorded.

4. One acceptable method of checking temperature below the concrete surface is given in the Portland Cement Association (PCA) book entitled "Design and Control of Concrete Mixtures" latest edition. The method is indicated below and it should be noted that the thermometer should be capable of recording high and low values for a given 24-hour period.



5. The exact method for surface and sub-surface concrete temperature monitoring shall be indicated in the contractor's cold weather concreting plan. The maximum permissible difference between the interior and surface temperature is 35 °F. Adjustments in protection method shall be implemented if the maximum permissible difference is exceeded.

#### F. Strength Specimen Handling

1. The Contractor is responsible for making, transporting, and curing all samples (beams or cylinders)
2. The Contractor is required to load the testing machine and dispose of the broken pieces.
3. Onsite, indoor curing facilities, meeting the requirements of ASTM C-31, shall be required for cold weather concreting operations.
4. Sampling for strength specimens shall be according to the Contract Special Provisions. Sampled concrete shall be transported to the indoor curing facilities for the casting of strength specimens.
5. The exact location and description of the curing facilities shall be indicated in the contractor's cold weather concreting plan.
6. The method of transporting concrete sampled from the grade to the curing facilities for casting shall be indicated in the contractor's cold weather concreting plan.

Steven J. Long, P.E.  
Acting Chief Engineer

Supersedes Policy Memorandum 2001-1 dated January 1, 2001

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**POLICY MEMORANDUM**

January 1, 2004

Springfield, Illinois

Number 2003-1

**TO: CONTRACTORS****SUBJECT: REQUIREMENTS FOR LABORATORY, TESTING, QUALITY CONTROL, AND PAVING OF  
SUPERPAVE BITUMINOUS CONCRETE MIXTURES FOR AIRPORTS****I. SCOPE**

The purpose of this policy memorandum is to define to the Contractor the requirements concerning the laboratory, testing, Quality Control, and paving of bituminous concrete mixtures utilizing Superpave technology. References are made to the most recent issue of the Standard Specifications for Construction of Airports and to American Society for Testing and Materials (ASTM) testing methods. The Quality Assurance and acceptance responsibilities of the Engineer are described in Policy Memorandum 96-3.

**II. LABORATORY**

The Contractor shall provide a laboratory located at the plant and approved by the Illinois Division of Aeronautics (IDA). The laboratory shall be of sufficient size and be furnished with the necessary equipment and supplies for adequately and safely performing the Contractor's Quality Control testing as well as the Engineer's acceptance testing as described in Policy Memorandum 96-3.

The effective working area of the laboratory shall be a minimum of 600 square feet with a ceiling height of not less than 7.5 feet. Lighting shall be adequate to illuminate all working areas. It shall be equipped with heating and air conditioning units to maintain a temperature of 70° F  $\pm$ 5°F.

The laboratory shall have equipment that is in good working order and that meets the requirements set forth in the following ASTM test standards:

ASTM D 70	Test Method for Specific Gravity and Density of Semi-Solid Materials
ASTM C 117	Test Method for Materials Finer than 75 $\mu$ m (No. 200) Sieve in Mineral Aggregates by Washing
ASTM C 136	Sieve or Screen Analysis of Fine and Coarse Aggregate
ASTM C 566	Total Moisture Content of Aggregate by Drying
ASTM D 75	Sampling Aggregates
ASTM D 2041	Theoretical Maximum Specific Gravity and Density of Bituminous Paving Mixtures
ASTM D 2172	Quantitative Extraction of Bitumen from Bituminous Paving Mixtures
IDOT	Ignition Method for Determining Asphalt Content
ASTM D 2726	Bulk Specific Gravity of Compacted Bituminous Mixtures using Saturated Surface Dry Specimens

ASTM D 3203	Percent Air Voids in Compacted Dense and Open Bituminous Paving Mixtures
ASTM D 2950	Density of Bituminous Concrete in Place by Nuclear Method
ASTM D 4125	Asphalt Content of Bituminous Mixtures by Nuclear Method
ASTM C 127	Standard Test Method for Specific Gravity and Absorption of Coarse Aggregate
ASTM C 128	Standard Test Method for Specific Gravity and Absorption of Fine Aggregate

The Asphalt Institute's *Superpave Mix Design, Superpave Series No. 2 (SP-2)*

The laboratory and equipment furnished by the Contractor shall be properly calibrated and maintained. The Contractor shall maintain a record of calibration results at the laboratory. The Engineer may inspect measuring and testing devices at any time to confirm both calibration and condition. If the Resident Engineer determines that the equipment is not within the limits of dimensions or calibration described in the appropriate test method, the Engineer may stop production until corrective action is taken. If laboratory equipment becomes inoperable or insufficient to keep up with mix production testing, the Contractor shall cease mix production until adequate and/or sufficient equipment is provided.

### III. MIX DESIGN TESTING

The Mix Design letter with accompanying approved Job Mix Formula (JMF) will be issued by the IDA Engineer of Materials. The Contractor will be required to perform the sampling and laboratory testing for the mix design according to the following guidelines: [Note: A testing summary chart can be found in Appendix B.]

- A. Material sources meeting the requirements of the contract shall be submitted in writing at or before the preconstruction conference in the following format:
  1. To: Steve Long, Acting Chief Engineer  
Attn: Mike Wilhelm, Engineer of Materials  
Division of Aeronautics  
One Langhorne Bond Drive  
Springfield, Illinois 62707
  2. Producer name and location of each aggregate
  3. Producer number for each aggregate (producers are assigned this number by IDOT Central Bureau of Materials)
  4. Material code for each aggregate
  5. Gradation and Quality designation for each aggregate (i.e. 022CA-11, etc.)
  6. Producer, producer number, and specific gravities of asphalt cement
  7. Performance Graded binder (typically PG 64-22) shall be used unless otherwise approved by the IDA Engineer of Materials.
- B. The Contractor shall obtain representative samples of each aggregate. The individual obtaining samples shall have successfully completed the IDOT Aggregate Technician Course under the IDOT Division of Highways, QC/QA program. The sample size shall be approximately 280 lb. for each coarse aggregate, 150 lb. for each fine aggregate, 15 lb. for the mineral filler or collected dust, and 1 gallon of asphalt cement.

- C. The Contractor shall split the aggregate samples down and run gradation tests according to the testing methods referenced in Appendix B of this memorandum. The remaining aggregates shall be set aside for further Mix Design testing. The results of the gradation tests, along with the most recent stockpile gradations, shall be reported by fax to the IDA Engineer of Materials for engineering evaluation. If the gradation results are deemed non-representative or in any way unacceptable, new representative samples may be required at the direction of the IDA Engineer of Materials. Only composite gradations are required under this procedure.
- D. Based on the accepted gradation results, the IDA Engineer of Materials will return blend percentages for each aggregate to be used in determining the Job Mix Formula. In addition, the Engineer of Materials shall specify directions for mix temperature and asphalt content(s), and number of Gyration (N<sub>des</sub>) for preparation of the Superpave Mix Design.
- E. After receipt of the information from step D., the Contractor shall make specimens and perform the following tests for each asphalt content specified by the Engineer. [Note: Actual test designation is referenced in Appendix B of this memorandum.]

**Marshall Tests**

Maximum Specific Gravity -- G<sub>mm</sub>

Bulk Specific Gravity -- G<sub>mb</sub>

% air voids -- V<sub>a</sub>

- F. All technicians who will be performing mix design testing and plant sampling/testing shall have successfully completed the IDOT Division of Highways Bituminous Concrete Level 1 Technician Course "Bituminous Concrete Testing". The Contractor may also provide a Gradation who has successfully completed the Department's "Gradation Technician Course" to run gradation tests only under the supervision of a Bituminous Concrete Level 2 Technician.
- G. The mix design testing results shall be reported to the IDA Engineer of Materials.
- H. The IDA Engineer of Materials shall generate and issue the approved Mix Design with the Job Mix Formula (JMF) for the manufacture of bituminous mixtures using the Contractor's testing results.
- I. The above procedure, III. MIX DESIGN TESTING, shall be repeated for each change in source or gradation of materials, and if the IDA Engineer of Materials has determined it to be necessary to obtain an acceptable mix

#### IV. MIX PRODUCTION TESTING

The Quality Control of the manufacture and placement of bituminous mixtures is the responsibility of the Contractor. The Contractor shall perform or have performed the inspection and tests required to assure conformance to contract requirements. Quality Control includes the recognition of defects and their immediate correction. This may require increased testing, communication of test results to the plant or the job site, modification of operations, suspension of bituminous mix production, rejection of material, or other actions as appropriate. The Resident Engineer shall be immediately notified of any failing tests and subsequent remedial action. Form AER M-14 shall be reported to the Engineer and Resident Engineer no later than the start of the next work day. In addition, AER M-9 and M-11 shall be given to the Resident Engineer daily (Appendix A). The Contractor shall provide a Quality Control (QC) Manager who will have overall responsibility and authority for Quality Control. This individual shall have successfully completed the IDOT Division of Highways Bituminous Concrete Level II Technician Course "Bituminous Concrete Proportioning and Mixture Evaluation." In addition to the QC Manager, the Contractor shall provide sufficient and qualified personnel to perform the required visual inspections, sampling, testing, and documentation in a timely manner. The following plant tests and documentation shall be required: [Note: A summary chart of testing can be found in Appendix B.]

- A. Minimum of one (1) complete hot bin or combined belt analysis per day of production or every 1,000 tons, whichever is more frequent.
- B. Minimum one (1) stockpile gradation for each aggregate and/or mineral filler per week when a batch plant is utilized. Minimum of one (1) gradation for each aggregate per day of production or every 1,000 tons when a drum plant is used, and one (1) gradation per week for mineral filler when a drum plant is used.
- C. A certification from the quarry for the total quantity of aggregate listing the source, gradation type, and quality designation of aggregate shipped. In lieu of a certification, the contractor may complete and submit an "Aggregate Certification of Compliance" form which may be obtained from IDA.
- D. Original asphalt shipping tickets listing the source and type of asphalt shipped.
- E. One mix sample per 1,000 tons of mix. The sample shall be split in half. One half shall be reserved for testing by the Engineer. The other half shall be split and tested by the Contractor for Extraction, Gradation, Maximum Specific Gravity, and Air Void tests in accordance with the appropriate ASTM standard referenced herein. [See Appendix B.]
  - 1. In place of the extraction test, the Contractor may provide the asphalt content by a calibrated ignition oven test using the IDOT Division of Highways' latest procedure. The correction (calibration) factor for aggregate type shall be clearly indicated in the reported test results.

From these tests, the Contractor shall interpret the test data and make necessary adjustments to the production process in order to comply with the approved JMF.

## V. QUALITY CONTROL

### A. Control Limits

Target values shall be determined from the approved JMF. The target values shall be plotted on the control charts within the following control limits:

<u>Parameter</u>	<u>Control Limits</u>	
	<u>Individual Test</u>	<u>Moving Avg. of 4</u>
% Passing		
1/2 in.	± 7 %	±4 %
No. 4	±7 %	±4 %
No. 8	±5 %	±3 %
No. 30	±4 %	±2.5 %
No. 200 *	±2.0 % *	±1.0 % *
Asphalt Content	±0.45 %	±0.2 %

\* No. 200 material percents shall be based on washed samples. Dry sieve gradations (-200) shall be adjusted based on anticipated degradation in the mixing process.

### B. Control Charts

Standardized control charts shall be maintained by the Contractor at the field laboratory. The control charts shall be displayed and be accessible at the field laboratory at all times for review by the Engineer. The individual required test results obtained by the Contractor shall be recorded on the control chart immediately upon completion of a test, but no later than 24 hours after sampling. Only the required plant tests and resamples shall be recorded on the control chart. Any additional testing of check samples may be used for controlling the Contractor's processes, but shall be documented in the plant diary.

The results of assurance tests performed by the Engineer will be posted as soon as available.

The following parameters shall be recorded on control charts:

1. Combined Gradation of Hot-Bin (Batch Plant) or Combined Belt Aggregate Samples (Drier Drum Plant). (% Passing 1/2 in., No. 4., No. 8, No. 30, and No. 200 Sieves)
2. Asphalt Content
3. Bulk Specific Gravity ( $G_{mb}$ )
4. Maximum Specific Gravity of Mixture ( $G_{mm}$ )

C. Corrective Action for Required Plant Tests

Control Limits for each required parameter, both individual tests and the average of four tests, shall be exhibited on control charts. Test results shall be posted within the time limits previously outlined.

1. Individual Test Result. When an individual test result exceeds its control limit, the Contractor shall immediately resample and retest. If at the end of the day no material remains from which to resample, the first sample taken the following day shall serve as the resample as well as the first sample of the day. This result shall be recorded as a retest. If the retest passes, the Contractor may continue the required plant test frequency. Additional check samples should be taken to verify mix compliance.
2. Asphalt Content. If the retest for asphalt content exceeds control limits, mix production shall cease and immediate corrective action shall be instituted by the Contractor. After corrective action, mix production shall be restarted, the mix production shall be stabilized, and the Contractor shall immediately resample and retest. Mix production may continue when approved by the Engineer. The corrective action shall be documented.

Inability to control mix production is cause for the Engineer to stop the operation until the Contractor completes the investigation identifying the problems causing failing test results.

3. Combined Aggregate/Hot-Bin. For combined aggregate/hot-bin retest failures, immediate corrective action shall be instituted by the Contractor. After corrective action, the Contractor shall immediately resample and retest. The corrective action shall be documented.

- a. Moving Average. When the moving average values trend toward the moving average control limits, the Contractor shall take corrective action and increase the sampling and testing frequency. The corrective action shall be documented.

The Contractor shall notify the Engineer whenever the moving average values exceed the moving average control limits. If two consecutive moving average values fall outside the moving average control limits, the Contractor shall cease operations. Corrective action shall be immediately instituted by the Contractor. Operations shall not be reinstated without the approval of the Engineer. Failure to cease operations shall subject all subsequently produced material to be considered unacceptable.

- b. Mix Production Control. If the Contractor is not controlling the production process and is making no effort to take corrective action, the operation shall stop.

## VI. TEST SECTION AND DENSITY ACCEPTANCE (Note: Applies only when specified.)

- A. The purpose of the test section is to determine if the mix is acceptable and can be compacted to a consistent passing density.

A quick way to determine the compactibility of the mix is by the use of a nuclear density gauge in the construction of a growth curve. An easy way to construct a growth curve is to use a good vibratory roller. To construct the curve, an area the width of the roller in the middle of the mat is chosen and the roller is allowed to make one compactive pass. With the roller stopped some 30 feet away, a nuclear reading is taken and the outline of the gauge is marked on the pavement. The roller then makes a compaction pass in the opposite direction and another reading is taken. This scenario is continued until at least two (2) passes are made past the maximum density obtained.

The maximum laboratory density potential of a given mix is a direct function of the mix design air voids. Whereas, the actual maximum field density is a function of the type of coarse aggregates, natural or manufactured sands, lift thickness, roller type (static or vibratory), roller and paver speed, base condition, mix variation, etc. All of these items are taken into consideration with the growth curve.

1. High Density in the Growth Curve. If the growth curve indicates a maximum achievable field density of between 95 to 98 percent of the Theoretical Maximum Density (D), you can proceed with the Rolling Pattern. On the other hand, if the maximum achievable density is greater than 98 percent, a quick evaluation (by use of an extractor, hot bin gradations, nuclear asphalt determinator, etc.) must be made of the mix. When adjustments are made in the mix, a new growth curve shall be constructed.
2. Low Density in the Growth Curve. If the growth curve indicates the maximum achievable density is below 94 percent, a thorough evaluation of the mix, rollers, and laydown operations should be made. After a thorough evaluation of all factors (mix, rollers, etc.), asphalt or gradation changes may be in order as directed by the Engineer. Again, any changes in the mix will require a new growth curve. Note that the nuclear density test is a quality control tool and not an acceptance test. All acceptance testing is to be conducted by the use of cores, unless otherwise specified.
3. Acceptance of Test Section. The Contractor may proceed with paving the day after the test section provided the following criteria have been met:
  - a. Four random locations (2 cores per location cut longitudinally and cored by the Contractor) will be selected by the Engineer within the test strip. The cores must show a minimum of 94% density.
  - b. All Superpave and extraction test results from mix produced for the test section must be within the tolerances required by specification.
  - c. The Contractor shall correlate his nuclear gauge to the cores taken in the test section. Additional cores may be taken at the Contractor's expense for this purpose within the test section area, when approved by the Engineer.
4. Density Acceptance under Production Paving. The responsibility for obtaining the specified density lies with the Contractor. Therefore, it is important that the nuclear density gauge operator communicate with the roller operators to maintain the specified density requirements. The Contractor shall provide a Bituminous Concrete Density Tester who has successfully completed the Department's "Bituminous Concrete Nuclear Density Testing Course" to run all required density tests on the job site. Density acceptance testing, unless otherwise specified, is described as follows:

- a. The Contractor shall cut cores at random locations within 500 ton sublots as directed by the Resident Engineer.
- b. The cores should be extracted so as not to damage them, since they are used to calculate the Contractor's pay.
- c. The Engineer will run preliminary  $G_{mb}$  tests on the cores to give the Contractor an indication of how compaction is running for the next day's paving.
- d. A running average of four (4) Maximum Theoretical Gravities ( $G_{mm}$ ) will be used for calculating percent compaction.
- e. Final core density tests and pay calculations will be performed by the Resident Engineer and delivered to the Contractor.
- f. Should the contractor wish to resample the pavement as a result of pay calculations resulting in less than 100% payment, the request must be made within 48 hours of receipt of the original payment calculations.

Steven J. Long, P.E.  
Acting Chief Engineer

Supersedes Policy Memorandum 2003-1 dated January 1, 2003

# APPENDIX A

# BITUMINOUS WORKSHEET

Airport: \_\_\_\_\_ Project No.: \_\_\_\_\_ AIP No.: \_\_\_\_\_  
Mix Design #: \_\_\_\_\_ Material Code: \_\_\_\_\_ Producer: \_\_\_\_\_  
Prod. #: \_\_\_\_\_

## AGGREGATE

Mat'l. Code: \_\_\_\_\_  
Producer #: \_\_\_\_\_  
Prod. Name \_\_\_\_\_  
Location: \_\_\_\_\_

## Percent Passing

### Sieve Size

1 inch	_____	_____	_____	_____	_____
3/4 inch	_____	_____	_____	_____	_____
1/2 inch	_____	_____	_____	_____	_____
3/8 inch	_____	_____	_____	_____	_____
No. 4	_____	_____	_____	_____	_____
No. 8	_____	_____	_____	_____	_____
No. 16	_____	_____	_____	_____	_____
No. 30	_____	_____	_____	_____	_____
No. 50	_____	_____	_____	_____	_____
No. 100	_____	_____	_____	_____	_____
No. 200	_____	_____	_____	_____	_____
Washed (y/n)	_____	_____	_____	_____	_____
O.D. Gravity	_____	_____	_____	_____	_____
App. Gravity	_____	_____	_____	_____	_____
Absorption	_____	_____	_____	_____	_____
Asphalt Gravity	_____	Asphalt Source	_____	Asphalt Producer No.	_____

## MARSHALL DATA

% Asphalt	_____	_____	_____	_____	_____
M. Stability	_____	_____	_____	_____	_____
Flow	_____	_____	_____	_____	_____
D	_____	_____	_____	_____	_____
0	_____	_____	_____	_____	_____
% Air Voids	_____	_____	_____	_____	_____
Q.C. Manager Name:	_____	Phone number:	_____		
Laboratory Location:	_____	Fax Number:	_____		
Remarks:	_____				

## Bituminous Mixture Daily Plant Output

Tons/Hr.	Batch Wt.	Batches	Loads	Tons	Mix No.	Date: _____
						Airport: _____
AC Prod.	Material	% Mix	Add Prod	Material	% AC	Ill. Project: _____
						AIP Project: _____
Temp. (F)	Agg Drier	Agg Bin	Asphalt	Bit. Mix	Bit. Mix	
Max					(RE/RT)	Consultant: _____
Min						Contractor: _____
Wtd. Avg.						Producer: _____

Mix Time	Dry	Wet	Total	Plant Oper.	Start	Stop	Delays	Hrs
Contract		Job No.	Qty	Contract		Job No.	Qty.	

Remarks \_\_\_\_\_

Bin	RAP	Bin 5	Bin 4	Bin 3	Bin 2	Bin 1	M.F.	New Bit	Wash	Changed
Mix %										
Lb/Bt-Rev										
Agg %								% Pass	Mix Form	Spec Range
1.5	Wt %									
	% Bin									
1	Wt %									
	% Bin									
3/4	Wt %									
	% Bin									
1/2	Wt %									
	% Bin									
3/8	Wt %									
	% Bin									
4	Wt %									
	% Bin									
8	Wt %									
	% Bin									
16	Wt %									
	% Bin									
30	Wt %									
	% Bin									
50	Wt %									
	% Bin									
100	Wt %									
	% Bin									
200	Wt %									
	% Bin									
Bit.										
AC - Prod	Ac-Code	Ticket	Date	Qty	AC-Prod	AC-Code	Ticket	Date	Qty	

# Bituminous Mixtures Extraction

Date: \_\_\_\_\_

Airport: \_\_\_\_\_ Consultant: \_\_\_\_\_

Illinois Project: \_\_\_\_\_ Contractor: \_\_\_\_\_

AIP Project No.: \_\_\_\_\_ Producer: \_\_\_\_\_

Mix #: \_\_\_\_\_ Dry Time: \_\_\_\_\_ Lot: \_\_\_\_\_ Sublot: \_\_\_\_\_

Type: \_\_\_\_\_ Washed: \_\_\_\_\_

Sieve	Wt.	Accum. Wt.	% Passing	Mix Formula	Tolerance	Spec Range
1.5						
1						
3/4						
1/2						
3/8						
4						
8						
16						
30						
50						
100						
200						
Tot Agg						
Bit						

Extraction Data		
Pan, New Filter & Sample	g	_____
Pan & New Filter	g	_____
Sample	g	_____
Pan, Used Filter, Aggregate	g	_____
Pan & New Filter	g	_____
Aggregate	g	_____
Pan & Used Filter	g	_____
Pan & New Filter	g	_____
Dust in Filter	g	_____
Sample	g	_____
Aggregate	g	_____
Bitumen	g	_____

New Bit:	Marshall Stab:	Blows:	Gyro:	Flow:	TSR:
Bulk SPGR:	Max SPGR:	% Voids:	DEN (PCF):		

Remarks: \_\_\_\_\_

CC: \_\_\_\_\_ Tested by: \_\_\_\_\_

AERM-11

## Bituminous Testing Summary

Project: \_\_\_\_\_

Illinois Project: \_\_\_\_\_

Airport: \_\_\_\_\_

AIP Proj.: \_\_\_\_\_

Mix Design No.: \_\_\_\_\_

Contractor: \_\_\_\_\_

Producer: \_\_\_\_\_

Remarks: \_\_\_\_\_

## Extraction Data

## Marshall Data

[illegible]

# APPENDIX B

**QUALITY CONTROL TESTING (PLANT)**

<b>PARAMETER</b>	<b>FREQUENCY</b>	<b>SAMPLE SIZE</b>	<b>TEST METHOD</b>	<b>REPORT FORM</b>
Aggregate Gradations: Hot bins for batch and continuous plants--- Individual cold-feeds or combined belt-feeds for drier drum plants.	Minimum 1 per day of production and at least 1 per 1000 tons.	CA07/11: 5000 gm CA13: 2000 gm CA16: 1500 gm Fine agg: 500 gm 1 gallon asphalt cement	ASTM C 136	AER M-9
Aggregate gradations: Stockpiles	Minimum 1 per aggregate per week per stockpile.	CA07/11: 5000 gm CA13: 2000 gm CA16: 1500 gm Fine agg: 500 gm *Note: The above test sample sizes are to be obtained from splitting down a larger sample from the stockpiles.	ASTM C 136	AER M-9
Maximum Specific Gravity	Minimum 1 per 1000 tons	1200 gm per test	ASTM D 2041	AER M-11 and AERM-14
Bulk Specific Gravity	Minimum 1 per 1000 tons	1250 gm per briquette	ASTM D 2726	AER M-11 and AERM-14
Marshall Stability and Flow	Minimum 1 per 1000 tons	1250 gm per briquette	ASTM D 1559	AER M-11 and AERM-14
% Air Voids	Minimum 1 per 1000 tons		ASTM D 3203	AER M-11 and AERM-14
Extraction	Minimum 1 per 1000 tons	1000 gm (surface) 1500 gm (base)	ASTM D 2172	AER M-11 and AERM-14
Ignition Oven Test	Minimum 1 per 1000 tons	1500 gm		AER M-14
Nuclear Asphalt Gauge	Minimum 1 per 1000 tons	1000-1100 gm	ASTM D 2145	AER M-14
Gyratory Brix	Minimum 1 per 1000 tons	4700-4800 gm 115 mm +/- 5 mm	AASHTO TP4-99	

### **MIX DESIGN TESTING**

<b>PARAMETER</b>	<b>FREQUENCY</b>	<b>SAMPLE SIZE</b>	<b>TEST METHOD</b>	<b>REPORT FORM</b>
Representative samples of each aggregate and asphalt cement.	1 per aggregate and 1 asphalt cement.	280 lb. (coarse) 150 lb. (fine) 15 lb. (min. filler) 1 gallon asphalt cement	ASTM D 75	N/A
Aggregate Gradation	1 per aggregate	CA07/11: 5000 gm CA13: 2000 gm CA16: 1500 gm Fine agg: 500 gm	ASTM C 136	Bituminous Worksheet (Appendix A)
Maximum Specific Gravity	2 per specified asphalt content	1200 gm per test	ASTM D 2041	Bituminous Worksheet (Appendix A)
Bulk Specific Gravity	3 briquettes per specified asphalt content	1250 gm per briquette	ASTM D 2726	Bituminous Worksheet (Appendix A)
Marshall Stability and Flow	3 briquettes	1250 gm per briquette	ASTM D 1559	Bituminous Worksheet (Appendix A)
% Air Voids	1 per specified asphalt content (Avg. of $G_{sb}/G_{mm}$ )		ASTM D 3203	Bituminous Worksheet (Appendix A)
Gyratory Brix	Minimum 1 per 1000 tons	4700-4800 gm 115 mm +/- 5 mm	AASHTO TP4-99	

**QUALITY CONTROL TESTING (PAVER)**

<b>PARAMETER</b>	<b>FREQUENCY</b>	<b>SAMPLE SIZE</b>	<b>TEST METHOD</b>	<b>REPORT FORM</b>
Nuclear Density Test	As required by the Contractor to amintain consistent passing density	Various locations	ASTM D 2950	

# **ATTACHMENT 9**

## **Miscellaneous Material Inspection Guide**

Pictures illustrating various rejection and repair criteria for corrugated metal and concrete pipe products are shown in Appendix A of this Guide

## **CASTINGS (FRAMES, GRATES & LIDS)**

### **Type, Size, and Number**

Determine the type, size, and number of castings to be inspected. Usually, you can get this information from the following:

- Contract and plans
- Contractor's order

### **Visual Inspection**

Make a visual inspection which includes the following:

- Look at the casting to see that it is the right type (as compared to the appropriate drawing).
- Check physical dimensions by measurement to establish that it is the correct size.

### **Gray Iron Castings**

The inspection of gray iron castings is primarily a visual inspection. The inspector should look for the casting to be free from cracks, fused-on sand, runners, risers, and other cast-on pieces. The casting should be relatively smooth. The tensile strength of gray iron is approximately 207 to 310 MPa (30-45 ksi).

#### a) Physical Dimensions

Checking the physical dimensions requires measuring the casting for substantial conformance to the standard drawing or the specified special drawing.

#### b) Weight of Casting

When adequate facilities are available, a random sampling of the casting may be weighed. The required weight is given on the standard drawing.

### **Ductile Iron Castings**

The inspection of ductile iron castings should follow the procedure set forth for gray iron castings. Ductile iron has a higher strength and ductility than gray iron. The tensile strength ranges from approximately 414 to 828 MPa (60-120 ksi).

c) Physical Dimensions

Follow the procedure for gray iron castings.

d) Weight of Casting

Follow the procedure for gray iron castings.

## **CONCRETE MASONRY UNITS AND MISCELLANEOUS PRECAST**

### **Concrete Masonry Units**

The inspection process for concrete masonry units is limited to a visual inspection with cores to be taken or test cylinders to be made periodically for compressive and absorption tests.

### **Visual Inspection**

During the visual inspection phase, the inspector shall check each unit for the following features.

a) Identification Marks

Identification marks shall be either etched, painted, or stamped with waterproof marking. A typical example of the following markings may be "[producer name] 5/21/96 M 199".

- Name or trademark of producer
- Identification of the plant (such as plant number)
- Date of manufacture
- ASTM Designation

b) Physical Measurements

- Internal diameter (Tolerances are specified in the appropriate ASTM specification.)
- Length (Tolerances are specified in the appropriate ASTM specification.)
- Wall thickness (Tolerances are specified in the appropriate ASTM specification.)

- Straightness (All tolerances are specified in the appropriate ASTM specification.)

## Defects

In addition to checking for the above features, each unit is checked for the following defects or impairments during the visual inspection phase.

a) Improper Reinforcement Placement

A thin layer of concrete over the steel may be evidenced by ghosting. Further inspection may be necessary to determine the proper depth of cover as stated in the appropriate specification. The exposure of ends of longitudinal steel, stirrups, lift holes, or spacers used to position the reinforcement (cages) during placement of the concrete is not considered a defect or cause for rejection. Any other exposed steel is considered a defect and is rejected.

b) Chipped or Broken Ends

Remove all the loose material, cutting the area back until the coarse aggregate will break under chipping rather than dislodging. The sides of the area to be patched shall be shaped with one or more faces having a minimum depth of 1/2 inch as perpendicular as possible to the surface of the area. The patch shall be cured according to the specifications. If a patch mix or grout is used, the patch shall be cured according to the manufacturer's recommendations. Aggregates may be used in the patch mix as recommended by manufacturer.

c) Patching

Defects inside or outside the unit may also be patched provided the cross-sectional area of the patch does not exceed 2 percent of the cross-sectional area of the pipe and 1/2 percent of the surface area of the pipe. No more than 1 patch per piece of pipe is permitted. All patching shall be done according to and with the pipe manufacturer's approved methods and patching materials.

d) Cracks or Fractures

These are considered cause for rejection if they pass through the wall. A single end crack that does not extend into the barrel of a unit is not a cause for

rejection. Any crack having a surface width of 0.25 mm (0.01 in.) or more is considered cause for rejection.

e) Out-of-round

Out-of-round (not of uniform diameter) is cause for rejection.

f) Honeycomb

If it is not deeper than 3/4 of the depth of the coarse aggregate & does not exceed 5 percent of the circumferential area of the unit, it may be considered acceptable. However, no unit is acceptable if the honeycomb is on the inside of the unit.

g) Barrel Roughness

The inside of the unit should be substantially free from surface roughness.

## Rejection

To assist in making decisions during the visual inspection phase, a number of photographs illustrating various reasons for rejection are included in Appendix A.

Each example is identified with an appropriate caption. In some of the illustrations the defect shown is not sufficient cause for rejection and is identified accordingly. Below is a tabular summary of reasons for rejection.

### CONCRETE MASONRY UNITS AND MISCELLANEOUS PRECAST

Cause for Rejection	Possible Repair
Fail physical test requirements	None
Chipped or broken ends	Patch, if not too large
Improper reinforcement placement	None
Excessive honeycomb	None
Insufficient wall thickness	None
Poor workmanship (roughness,etc.)	None
Improper diameter or length	None
Out-of round	None
Excessive cracks for fractures	None

## **ELECTRICAL CABLE & CONDUIT**

### **Inspection Procedures**

Prior to performing the inspections and/or reporting of electrical materials, the specific contract should be checked for special provisions or allowances that may be included. Physical properties of materials, such as electrical cable, conduit, and fittings, can be measured, counted, and given a visual inspection.

Inspection standards, specifications, and tolerances are covered in the applicable sections of AASHTO, NEMA, ANSI, and ASTM specifications; the Standard Specifications; and the contract plans and/or special provisions.

### **Electrical Cable**

Electrical cable should be inspected on reel lots when possible. Conductor size may be measured by micrometer, and the number of conductors in stranded wire counted. Specific data can be found in ASTM B 3M, B 8M, B 33M, B 8M, and B 189M. Insulation type, thickness, color, and markings should be examined and compared to requirements of the project specifications.

### **Conduit and Fittings**

Acceptance of conduit is by visual inspection at the job site.

Conduit and fittings should be inspected according to the specifications. Wall thickness should be measured with a micrometer, and the galvanizing should be measured with a microtest gauge. Samples may periodically be taken by the inspector for the Division of Aeronautics to have tested by the Bureau of Materials and Physical Research.

### **Unit Duct**

Unit duct should be inspected according to the shop drawings and for contract and plan compliance.

The inspector should verify that the duct is labeled with the proper NEMA or NEC markings, as applicable.

## **LIGHT COMPONENTS**

### **Inspection Procedures**

Inspection standards and specification dimensions and tolerances for these components may be found in the project specifications, contract plans, special provisions, and shop drawings. These materials can be measured, counted, and given a visual inspection by the Resident Engineer.

### **Light, Poles, and Mast Assemblies**

These materials should be inspected for conformance with shop drawings and specifications. Galvanized products should be checked for minimum coating thickness with a thickness gauge.

## **Corrugated Steel Pipe**

### **Corrugated Steel Pipe**

The inspector shall be furnished an itemized list indicating the sizes, lengths, gauges, coating, special treatments when required, and accessories for all products that are requested to be inspected. The products must be easily accessible so that a complete visual and dimensional examination can be made.

The following items are specific areas that the inspector should check during the inspection process and compare with the appropriate references.

#### a) Marking

An identification stamp shall be every 0.6 to 1.5 to 2 meters (2-5 ft.) on sheet in coils or cut lengths and on each metal plate. Mixing of brands of the same base metal with the same coating thickness is permitted for galvanized corrugated steel culvert pipe.

#### b) Dimensions

Check for compliance with appropriate tolerances described below.

##### 1) Thickness

Flat sheet material shall be measured at any point not less than 9 mm (3/8 in.) from an edge. Corrugated products are to be measured on the tangents of the

corrugations. Assure gauge of metal conforms to the type requirements for pipe size and gauge in the specifications.

2) Diameter

Diameter shall be measured on the inside crest of the corrugations. Annular pipe diameters may, as an alternate, be measured in the valley of the outside circumference. This does not apply to helical pipe. Circular pipe and reformed pipe arch tolerances are based on nominal diameters. Tolerances for plate pipe are governed by both the equivalent diameter and corrugation size.

3) Length

Length is measured as the net length of the finished product. Average length deficiency for pipe shipment shall not exceed 1 percent of lineal meter ordered.

c) Corrugations

Corrugations shall form smooth, continuous curves and tangents and may be either annular, spiral, or a combination of both. The specifications should denote the corrugation sizes permitted for a specific diameter and type of pipe. The depth, pitch, and spacing of the corrugations should be checked along with the subsequent minimum lap width requirement of the finished product.

d) Rivets

The location, size, and number of rivets for corrugation of the longitudinal seam are based on the sheet thickness, corrugation size, and the diameter of the pipe.

Circumferential seam rivets shall be of the same size as for longitudinal seams with a maximum 150-mm (6-in.) spacing, except that only 6 rivets will be required for 300-mm (12-in.) diameter pipe.

e) Spot Weld

The location, size, and number of spot welds substantially comply with the rivet requirements.

f) Lock or Welded Seams

For helically corrugated pipe, seams shall be continuous from end-to-end of each pipe length.

g) Metallic Coating

The weight of coating is the total amount on both surfaces of the sheet expressed in grams per square meter ( $\text{g/m}^2$ ) (oz./ sq. ft.). A magnetic type gauge can be used to check the weight of zinc coating. All coating shall adhere to the base metal such that no peeling occurs while the material is being corrugated and formed into the final product. Products having either bruised, scaled, broken, hair-checked, or blistered coating or having "white rust" (zinc oxide) shall be rejected. Bituminous-coated or paved products shall be checked for proper thickness areas.

h) Workmanship

The completed products shall show careful, finished workmanship in all particulars. Following are some defects that indicate poor workmanship, and the presence of any or all of them in any individual item or generally in any shipment shall be sufficient cause for rejection.

- Variation from a straight centerline
- Elliptical shape in pipe intended to be round
- Dents or bends in the metal
- Metallic coating which has been bruised, broken, or otherwise damaged
- Lack of rigidity
- Illegible markings on the steel sheet
- Ragged or diagonally sheared edges
- Uneven laps in riveted or spot-welded pipe
- Loose, unevenly lined, or unevenly spaced rivets
- Defective spot welds or continuous welds
- Loosely formed lock seams

## **Miscellaneous**

a) Coupling Bands

Coupling bands shall be of the same metallic material as the pipes being connected. Specifications require that the bands shall provide sufficient strength to preserve alignment and prevent pipe separation or soil infiltration. The band may be 3 sheet thickness lighter than that used to fabricate the pipe but not less than 1.32 mm (0.052 in.) thick (AASHTO M 36M, Table 12). The widths and configurations for

bands will vary for different diameters of pipes and for different styles or depths of corrugations.

Neither bituminous coating nor precoating will be required for connecting bands except when used in conjunction with either precoated fully lined pipe or arches; the bands shall then be precoated and be of the hugger or annular type.

b) Perforations

Perforations shall be approximately circular and clean cut, have a nominal diameter in accordance with the specifications, and be arranged in rows parallel to the axis of the pipe. Perforations shall be located on the inside crest or along the neutral axis of the corrugations. The rows of perforations and their locations are based on the diameter of the pipe as specified in AASHTO M 36M.

c) End Finish

A reinforced end finish is not required on inlets nor outlets of corrugated steel pipe; however, when specified, it shall be finished in a satisfactory manner. Cut ends on helically corrugated pipe must be painted with Zinc-rich paint.

d) Specialty Items

Special pipe, perforated casings for stone wells, flumes, and pipe requiring a diameter not covered in the specifications shall meet the requirements of the plans or special provisions. The plans or special provisions governing these special items should be furnished to the fabricator in order that the product can be properly constructed and subsequently inspected. Tees, angles, elbows, etc., should be fabricated by welding—not by riveting. An approved coating shall be applied after welding. Pipe having a diameter not covered in the specifications shall be of the same gauge and have the same lap as pipe of the nearest diameter in the specifications. If the diameter should be the same number of inches between diameters given in the specifications, the pipe should be fabricated in accordance with the larger diameter.

## **Handling**

The field inspection made by the Resident Engineer shall include an examination of detrimental defects of broken, peeled, and otherwise damaged coating caused by

carelessness in handling. Proper care shall be exercised in loading, transporting, unloading, and delivering the finished product to the construction site and in its placement. When nesting or loading, boards or other suitable material running the full length of the product shall be used to prevent metal from rubbing or resting against metal and to prevent damage to the pipe.

Special care shall be exercised in preventing rivets or bolts from scratching the adjacent product. Chains or metal cables used in binding the load and unloading shall be encased to prevent damage, or suitable material shall be fastened securely between the product and chains or cable. Wood skids or other approved devices shall be used in loading and unloading. Metal lever bars will not be permitted in loading and unloading. Dragging the product across rocky ground or dragging in such manner as to cause gouging or removal of the coating will not be permitted.

## **CONCRETE PIPE AND DRAIN TILE**

### **Visual Inspection**

During the visual inspection phase, the inspector shall check each piece of pipe for the following features.

#### a) Physical Characteristics

##### 1) Physical Measurements

- Internal pipe diameter (Tolerances are specified in the appropriate ASTM specification.)
- Length of pipe (Tolerances are specified in the appropriate ASTM specification.)
- Wall thickness (Tolerances are specified in the appropriate ASTM specification.)
- Straightness in the case of non-reinforced pipe (All tolerances are specified in the appropriate ASTM specification.)

b) Defects

In addition to checking the pipe for the above features, each piece is checked for the following defects or impairments during the visual inspection phase.

1) Improper Reinforcement Placement

A thin layer of concrete over the steel may be evidenced by ghosting. Further inspection may be necessary to determine the proper depth of cover as stated in the appropriate specification. The exposure of ends of longitudinal steel, stirrups, lift holes, or spacers used to position the reinforcement (cages) during placement of the concrete is not considered a defect or cause for rejection. Any other exposed steel is considered a defect and is rejected.

2) Chipped or Damaged Ends

This is considered cause for rejection if the damage is halfway or more into the joint and has a length of more than 10 percent of the end circumference. Small chips may be properly patched and accepted. Patching shall be performed by the manufacturer only when authorized by the Resident Engineer.

3) Patching

Defects inside or outside the barrel may also be patched provided the cross-sectional area of the patch does not exceed 2 percent of the cross-sectional area of the pipe and 1/2 percent of the surface area of the pipe. No more than one patch per piece of pipe is permitted. All patching shall be done according to and with the pipe manufacturer's approved methods and patching materials.

4) Cracks or Fractures

These are considered cause for rejection if they pass through the wall. A single end crack that does not extend into the barrel of the pipe is not a cause for rejection. Any crack having a surface width of 0.3 mm (0.01 in.) or more and more than 300 mm (12 in.) in length, regardless of position in the wall, is considered cause for rejection.

5) Out-of-round

Out-of-round (not of uniform diameter) pipe is cause for rejection.

6) Honeycomb

If it is not deeper than 3/4 of the depth of the coarse aggregate and does not exceed 5 percent of the circumferential area of the pipe, it may be considered acceptable. However, no pipe is acceptable if the honeycomb is on the inside of the pipe.

7) Barrel Roughness

The inside of the pipe should be substantially free from surface roughness.

8) Over-packing

This is evidenced by excess material being present in the bell end due to its being shoved past the end of the barrel during production. A small amount is not cause for rejection. However, if a lamination occurs, the pipe shall be rejected.

c) Rejection

**CONCRETE PIPE AND DRAIN TILE**

Cause for Rejection	Possible Repair
Fail physical test requirements	None
Chipped or broken ends	Patch, if not too large
Excessive overpacking/feather edge	None
Improper reinforcement placement	None
Excessive honeycomb	None
Insufficient wall thickness	None

Cause for Rejection	Possible Repair
Poor workmanship (roughness,etc.)	None
Improper diameter or length	None
Out-of round	None
Excessive cracks for fractures	None

**PLASTICS**

## **Inspection Procedures**

Plastic products covered in this material group encompass a wide variety of materials made of natural or synthetic organic compounds. These compounds are united through a process called "polymerization". The material can subsequently be molded, extruded, or cast into various shapes and forms, or drawn into filaments for use as a textile fiber.

Inspection standards for the acceptance of these products are covered in the applicable sections of AASHTO and ASTM specifications; the Standard Specifications; and the contract plans and/or special provisions.

### **Plastic Pipe**

This covers a variety of plastic pipe made from polyvinyl chloride (PVC) and from polyethylene (PE) according to various AASHTO or ASTM specifications.

Many of these products also have specifications for cell classification. The cell classification, along with manufacturer's name or trademark, size, and ASTM or AASHTO designation, is required to be on all PVC pipe.

The uses for these products include pipe drains, pipe underdrains, pipe culverts, storm sewer, backslope drains, culvert liners, and water main. Care should be taken to assure that the proper product is used for the specific application. Information on application can be found in the *Standard Specifications for Water & Sewer Main Construction in Illinois*, the appropriate section of the IDOT Standard Specifications, special provisions, and Bureau of Design & Environment Policy Memorandum "Pipe Culverts and Storm Sewer".

### **Geotextile Fabrics**

Products under this heading include woven, nonwoven, and knitted fabrics made from polypropylene, nylon, polyethylene, and polyester. These fabrics are specified for various types of construction operations or pay items, and, as such, specifications denote the weight and strength of material required for a particular use. The inspector should know the intended use of the fabric material that is being inspected. Inspection consists of verification that the unit weight and performance data meets contract requirements.

## **Manhole Steps**

The manufacturer shall certify that plastic manhole steps met the provisions of ASTM C 478.

## **CLAY PIPE & DRAIN TILE**

### **Visual Inspection**

Pipe shall be checked for the following:

- Out-of-round
- Size and dimensions
- Straightness
- Blisters
- Fractures and cracks
- Lack of glaze
- Markings

Tile shall be checked for the following:

- Cracks
- Checks
- Chips
- Shape
- Presence of foreign minerals and chemicals.

Drain tile in dry condition should give a clear ring when tapped lightly with a hammer.

## **CAST IRON PIPE**

### **Inspection Procedures**

Acceptance of cast iron pipe is by manufacturer certification as well as visual inspection for condition and defects.

### **Cast Iron Water Pipe**

Cast iron water pipe shall conform to Federal Specification WW-P-421. This federal specification gives requirements, such as strength, pipe thickness, weights, etc., for different type of pipe. It also gives references to American National Standards Institute (ANSI A21) standards which are needed for specifications on lined pipes, joint materials, etc.

### **Cast Iron Soil Pipe**

Cast pipe is made of gray cast iron produced by a method that provides control over chemical and physical properties. The cast pipe shall be sound, true to pattern, and of compact, close grain. The interior surface shall be reasonably smooth and free from defects which would make the pipe unfit for the use intended.

Cast iron soil pipe shall conform to Federal Specification WW-P-401 which in turn references ASTM A 74M which details physical and chemical requirements and dimensional tolerances. The specifications for a particular job are referenced in the contract plans and special provisions.

## **CORRUGATED ALUMINUM PIPE**

### **Inspection Procedures**

The base metal for products included in this material group is sheet aluminum or structural aluminum plate.

Each approved product shall be stamped on the inside and outside of one end with an "ILL OK" stamp. An LA-15 may be issued for shipping with the bill of lading.

The following items are specific areas that the inspector should check during the inspection process and compare with the appropriate references.

#### a) Markings

An identification stamp shall be every 0.6 to 1.5 m (2-5 ft.) on coiled sheet used in spiral corrugated pipe and on each sheet or plate used for annular pipe or structural plate products.

b) Dimensions

1) Thickness

Flat sheet material shall be measured at any point not less than 10 mm from an edge. Corrugated products are to be measured on the tangents of the corrugations. Assure gauge of metal conforms to the specifications type requirement for pipe size and use.

2) Diameter

Diameter is measured on the inside crest of the corrugations. Circular pipe and reformed pipe arch tolerances are based on nominal diameters. Tolerances for plate pipe arches are governed by both the equivalent diameter and the corrugation size.

3) Length

Length is measured as the net length of the finished product. The average length deficiency for pipe shipment shall not exceed one percent of lineal feet ordered.

c) Corrugations

Corrugations shall form smooth, continuous curves; tangents may be either annular, spiral, or a combination of both. The specifications denote the corrugation sizes permitted for a specific diameter and type of pipe. The depth, pitch, and spacing of the corrugations should be checked along with the subsequent minimum lap width requirement of the finished product.

d) Rivets

The location, size, and number of rivets per corrugation of the longitudinal seam are based on the sheet thickness, corrugation size, and the diameter of the pipe.

Circumferential seam rivets shall be of the same size as for longitudinal seams with a maximum 150-mm (6-in.) spacing except that only six rivets will be required for 300-mm (12-in.) pipe.

e) Lock Seams

For helically corrugated pipe, the lock seam shall be continuous from end-to-end of each pipe length, and lapped surfaces shall be in tight contact.

f) Workmanship

The completed products shall show careful finished workmanship in all particulars.

**Miscellaneous**

a) Coupling Bands

Specifications require that the bands shall provide sufficient strength to preserve alignment and to prevent pipe separation or soil infiltration. Bands shall be aluminum, but either aluminum- or zinc-coated steel may be used for the fasteners of the connecting bands. The band may be three sheet thickness lighter than the pipe being connected but not less than 1.2 mm (0.048 in.). The widths and configurations for bands will vary depending on the diameter of pipe and the style or depth of corrugations. Bituminous coating for connecting bands is not required.

b) Structural Plate Bolts

Plates of longitudinal and circumferential seams shall be staggered so that not more than three plates come together at one point. The bolt and nut assembly fasteners for aluminum plates may be either zinc-coated steel, aluminum-coated steel, or aluminum.

c) Perforations

Perforations shall be approximately circular and clean-cut, have a nominal diameter in accordance with the specifications, and be arranged in rows parallel to the axis of the pipe. Perforations shall be located on the inside crest or along the neutral axis of the corrugations. The rows of perforations and their locations are based on the diameter of the pipe as indicated in AASHTO M 196M.

d) End Finish

A reinforced end finish is not required on inlets nor outlets of corrugated aluminum pipe; however, when specified, it shall be finished in a satisfactory manner.

e) Specialty Items

Special pipe or aluminum products not covered by specifications shall meet the requirements of the contract plans and/or special provisions. Data governing these specialty items should be furnished the fabricator so that the product can be properly constructed and subsequently inspected.

### **Handling**

The field inspection made by the Resident Engineer shall assure that damage has not occurred through carelessness in the loading, transporting, unloading, and delivering the finished product to the construction site and in its final installation.

## **LANDSCAPE**

### **Inspection Procedures**

Landscaping and planting materials include seeds, fertilizers, sod, plants, shrubs, trees, mulches, and erosion control items. The inspection procedure for products in this category is variable and therefore will be described separately.

### **Fertilizer**

The inspector should ascertain that the manufacturer's guaranteed analysis is stamped on the bag and that it is in conformance with the required analysis. In the case of bulk shipments, the producer must certify in writing as to the analysis, and the inspector, in turn, must verify it is in compliance with the project requirements.

### **Seeds**

Seeds will be tested by an authorized laboratory, and the cost of the testing will be a part of the unit bid price. Acceptance of seeds will be based on receipt and approval of a certification covering tests from each lot of seed. The certification must be signed by a registered seed technologist. Lots older than 12 months shall be recertified. Seeds may

be sampled at destination on a random basis for comparison with the certification and for compliance to the specifications.

### **Plants, Trees, and Shrubs**

Plants, trees, and shrubs are to be visually inspected. Trees and shrubs are to be checked for height and/or diameter in accordance with the project provisions. In addition, the spread of the root system for bare-root plants should be checked just as the size of the ball should be checked on balled and burlapped plants.

### **Special Erosion Control Material**

Inspection of erosion control items, such as excelsior blanket, knitted straw mat, staples, stakes, and fiber mat, consists of visual examination of the products for condition and verification from the certification that they meet specifications. If compliance cannot be verified, the material shall be rejected.

# APPENDIX A



Figure 1 - Crack Through Wall – Cause for rejection



Figure 2 - Crack Through Wall – Cause for rejection



Figure 3 - Cracks – Cause for rejection.



Figure 4 - Crack – Cause for rejection



Figure 5 - Chipped End Section – May be patched



Figure 6 - Cracked End Section – Cause for rejection



Figure 7 - Broken Spigot – May not be repaired



Figure 8 - Chipped Spigot – May be repaired.



Figure 9 - Overpacking – Sufficient to Reject



Figure 10 - Overpacking – Sufficient to Reject



Figure 11 - Overpacking – Sufficient to reject



Figure 12 - Acceptable Patch



Figure 13 - Acceptable Patch in Bell



Figure 14 - Unacceptable Patch



Figure 15 - Honeycomb Inside – Sufficient to reject



Figure 16 - Chipped Spigot – May be repaired



Figure 17 - Pipe Spigot Out of Round – Reject



Figure 18 - Exposed Wire Inside – Cause for rejection

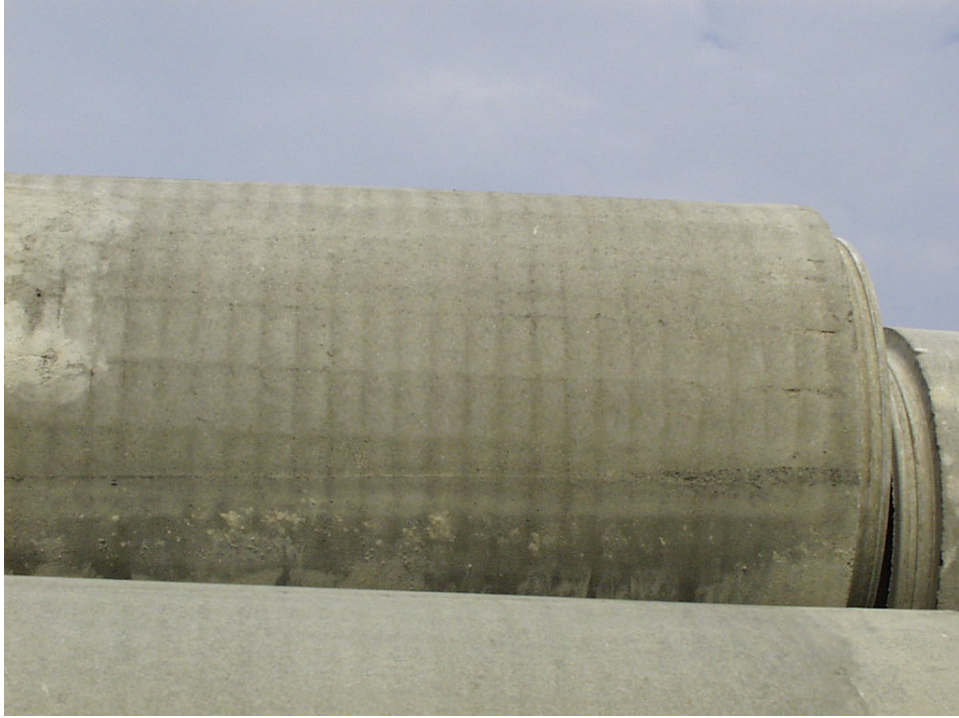


Figure 19 - Exposed Wire – Cause for Rejection



Figure 20 - Exposed Wire – Cause for rejection



Figure 21 - Exposed Wire – Sufficient to reject



Figure 22 - Exposed Wire Ends – Not cause for rejection



Figure 23 - Defect in Workmanship – Cause for rejection



Figure 24 - Broken Bell – Too Large to Repair



Figure 25 - Properly Marked Precast

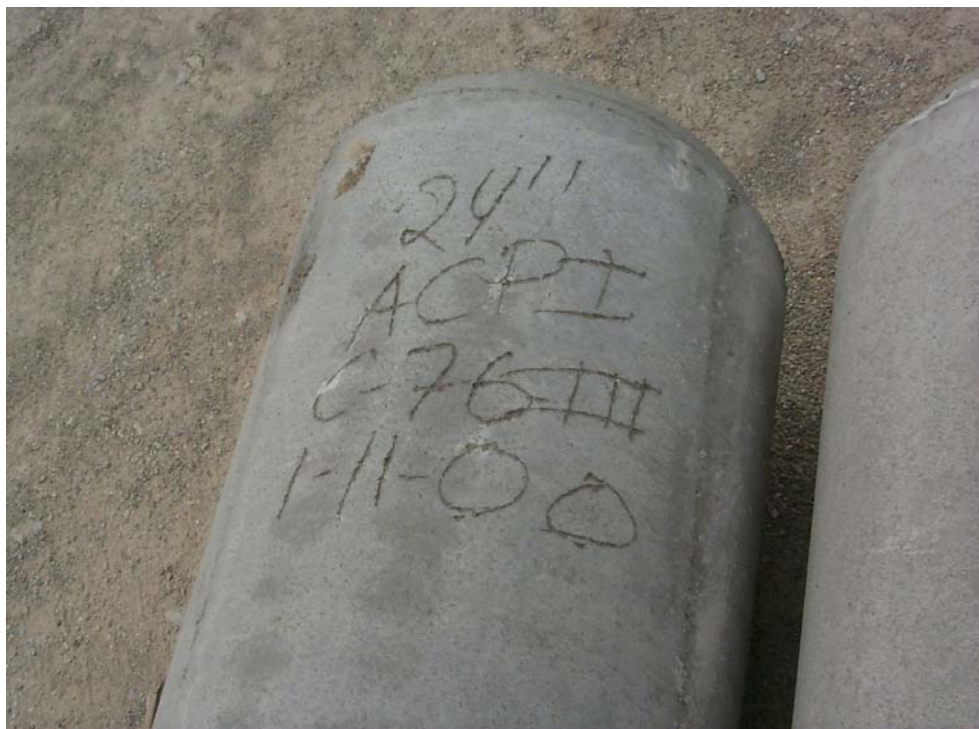


Figure 26 - Acceptable Pipe Markings



FIGURE 1  
BLISTER SPOTS IN THE GAL-  
VANIZING.

Blister spots  
in the  
galvanizing

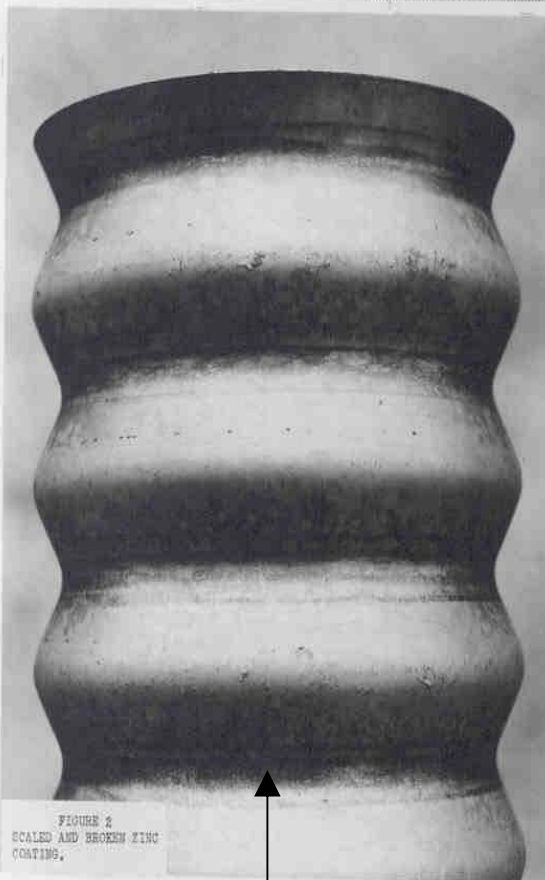


FIGURE 2  
SCALED AND BROKEN ZINC  
COATING.

Scaled & broken  
zinc coating

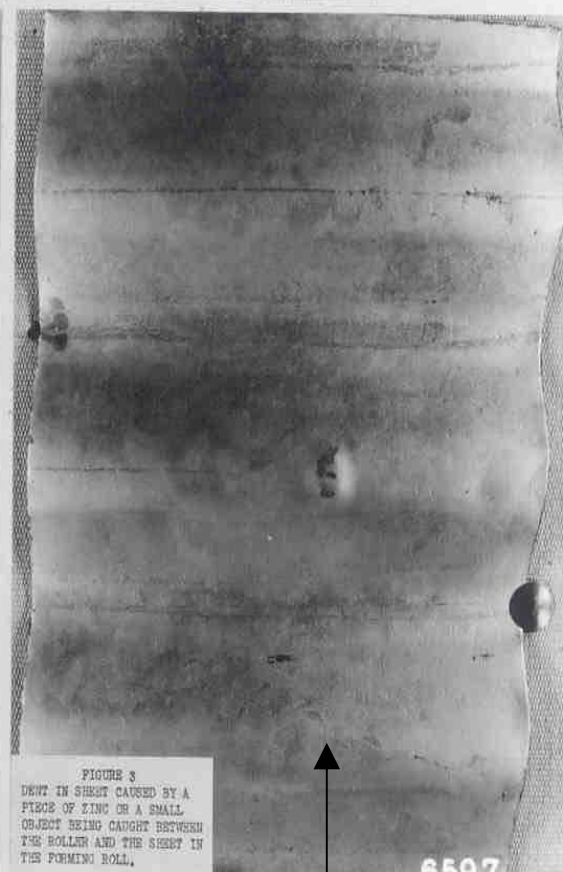
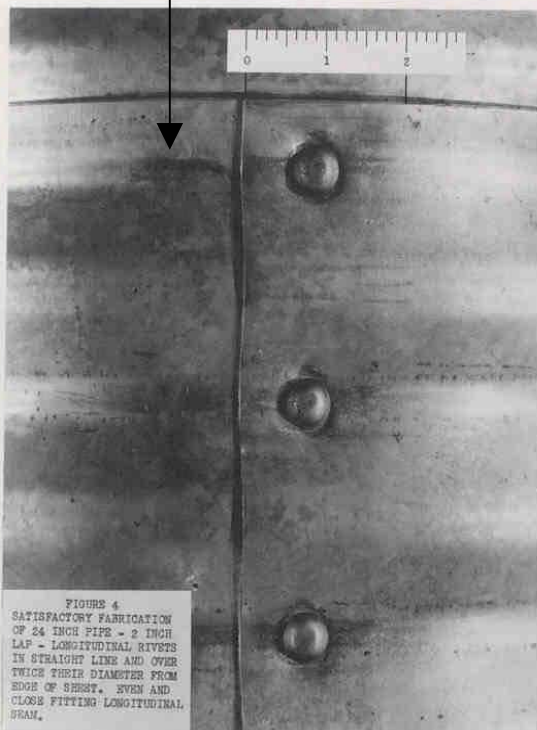


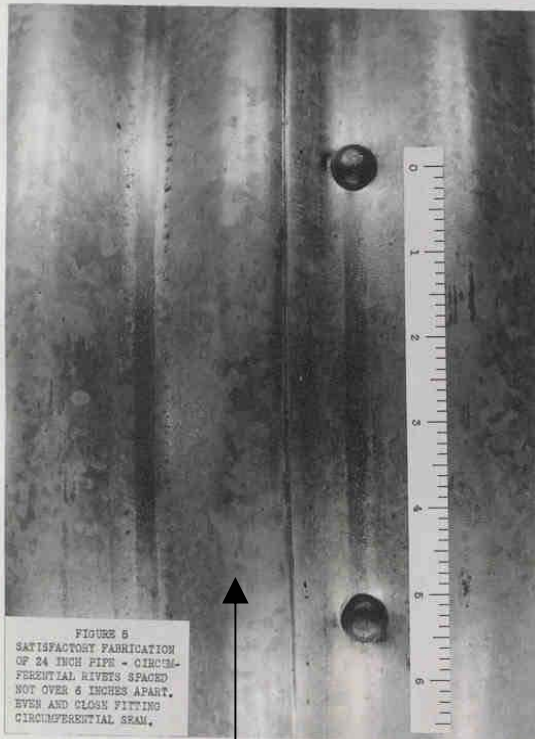
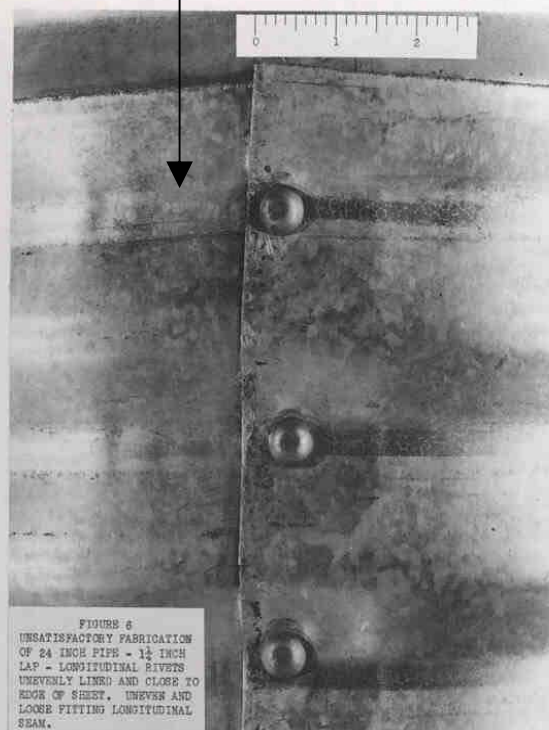
FIGURE 3  
DENT IN SHEET CAUSED BY A  
PIECE OF ZINC OR A SMALL  
OBJECT BEING CAUGHT BETWEEN  
THE ROLLER AND THE SHEET IN  
THE FORMING ROLL.

Dent in sheet caused by a piece of zinc or a  
small object being caught between the roller  
and the sheet in the forming mill

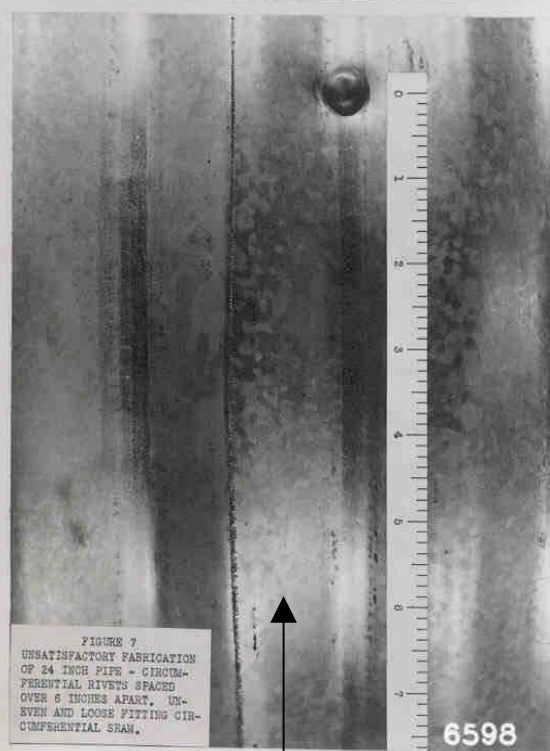
Satisfactory fabrication of a 24 inch pipe – 2 inch lap – longitudinal rivets in straight line and over twice their diameter from edge of sheet. Even and close fitting longitudinal seam.



Unsatisfactory fabrication of a 24 inch pipe – 1-1/4 inch lap – longitudinal rivets unevenly lined and close to edge of sheet. Uneven and loose fitting longitudinal seam.



Satisfactory fabrication of a 24-inch pipe – circumferential rivets spaced not over 6 inches apart. Even and close fitting circumferential seam.



Unsatisfactory fabrication of a 24-inch pipe – circumferential rivets spaced over 6 inches apart. Uneven and loose fitting circumferential seam.

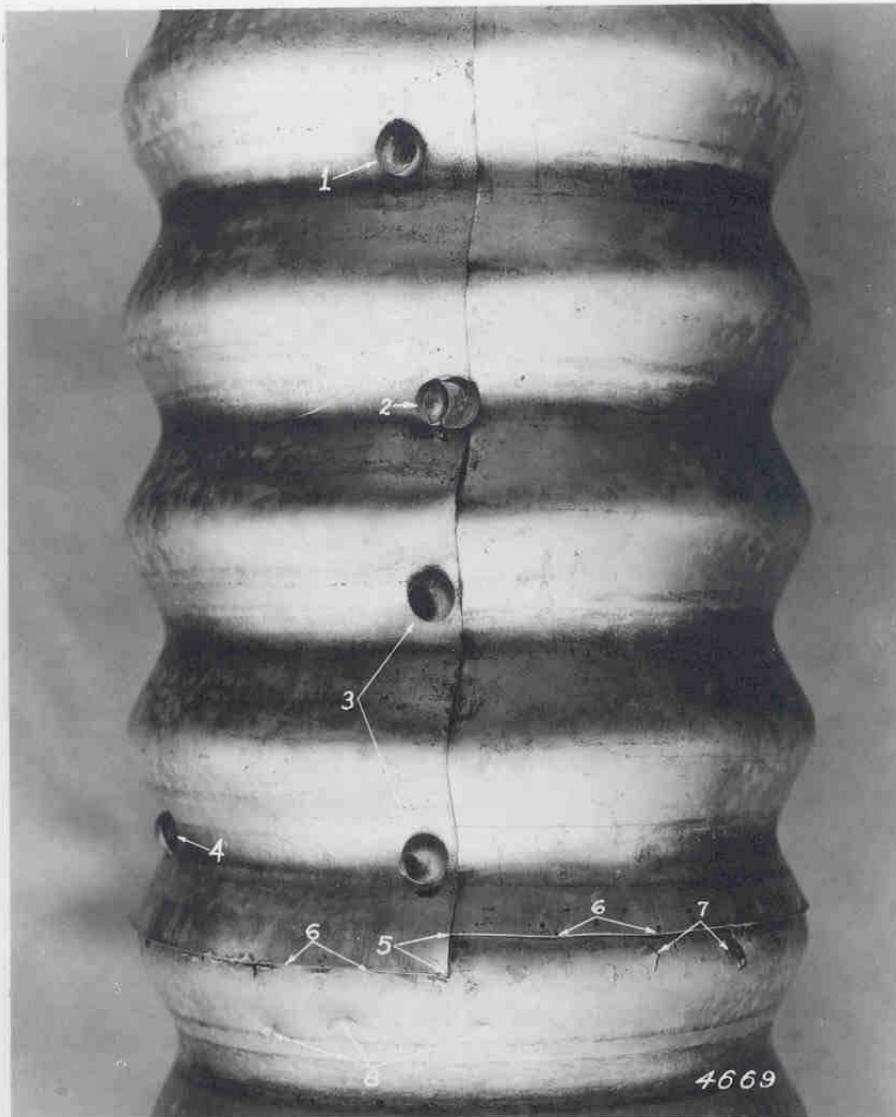


FIGURE 8  
UNSATISFACTORY FABRICATION

1. Rivet Head Cut On One Side.
2. Rivet Head Badly Cut And Close To Edge Of Sheet.
3. Rivets Close To Edge Of Sheet.
4. Rivet Driven Very Crooked.
5. Very Poor Seam Caused By Uneven Sheet And Extra Wide Lip Which Flared Up Instead Of Fitting Tight Over The Lip On The Under Sheet.
6. Where Flare Was Hammered Down To Close The Opening Between Sheets.
7. Broken And Scaled Zinc.
8. Dents And Bruises Caused By Hammering.

5600

TYPES OF END FINISH

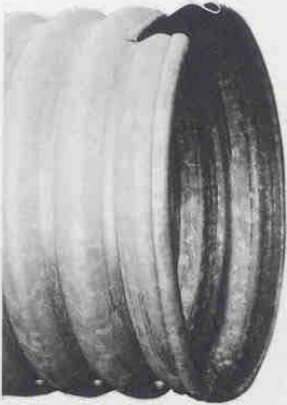


Figure 9 - Single Roll  
Satisfactory



Figure 10 - One and One-Half Roll  
Satisfactory



Figure 11 - Double Roll  
Satisfactory



Figure 12 - Single Roll Over Round Iron Rod  
Satisfactory



Figure 13 - Galvanized Bar  
Satisfactory

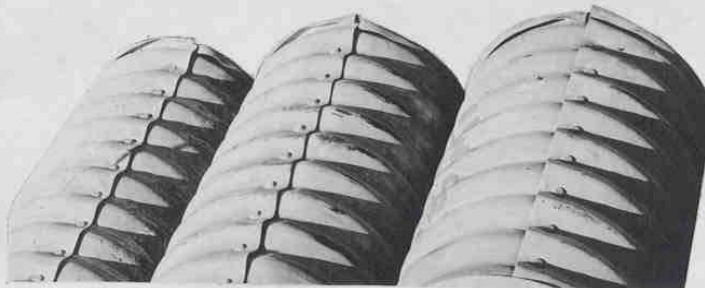


Figure 14 - Unsatisfactory

6599

LONGITUDINAL SEAM

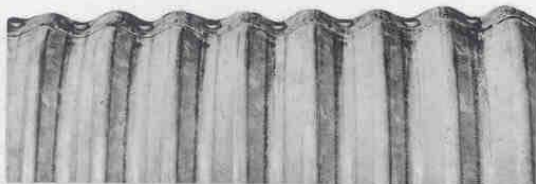


Figure 15 - Satisfactory

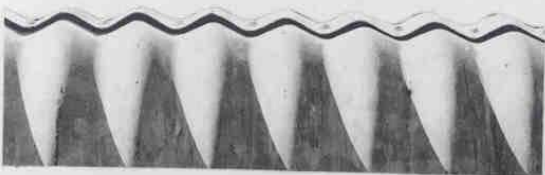


Figure 17 - Unsatisfactory

CIRCUMFERENTIAL SEAM



Figure 16 - Satisfactory

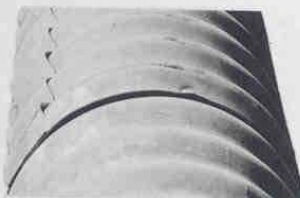


Figure 18 - Unsatisfactory

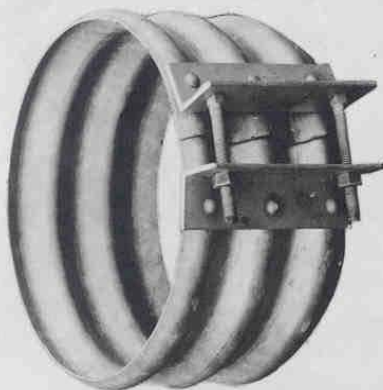


Figure 19 - Satisfactory Type of Coupling Band

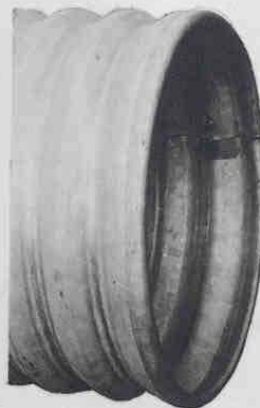


Figure 20 - Satisfactory Position of Zinc Tag



Figure 21 - Satisfactory Joint of Perforated Pipe

6601